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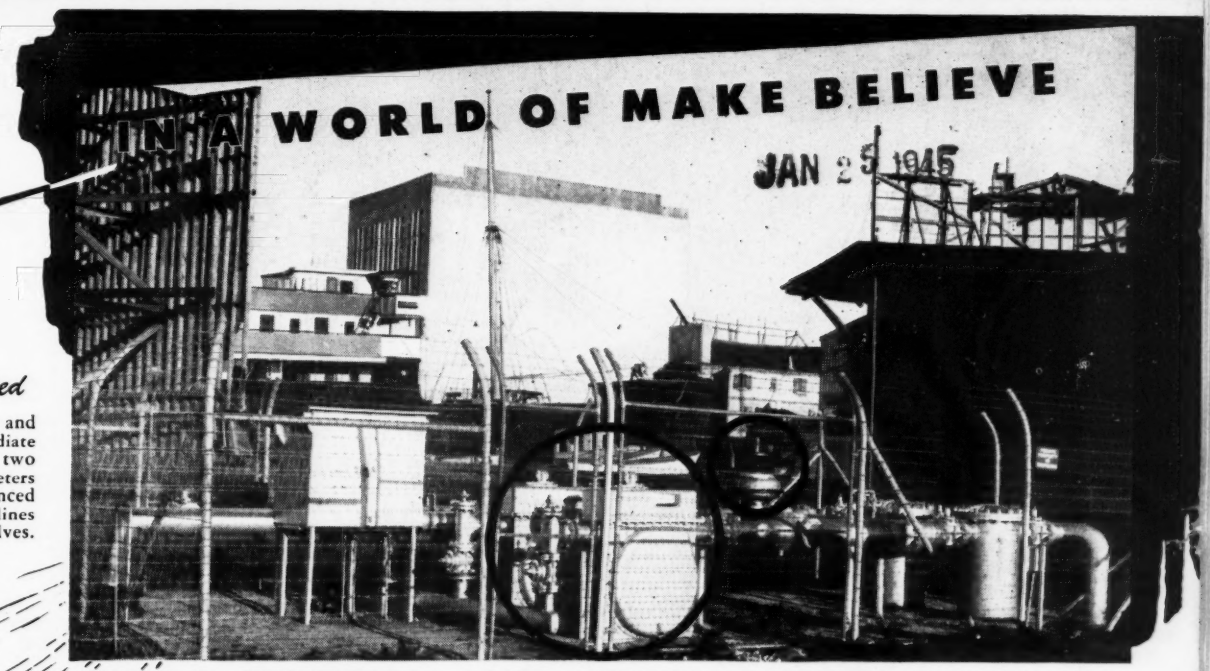

The Camera is Focused

On the large volume meter and regulator setting in the immediate foreground. Equipment includes two EMCO No. 5 Pressed Steel Meters and EMCO Low Pressure Balanced Valve Regulators installed on lines controlled with Nordstrom Valves.

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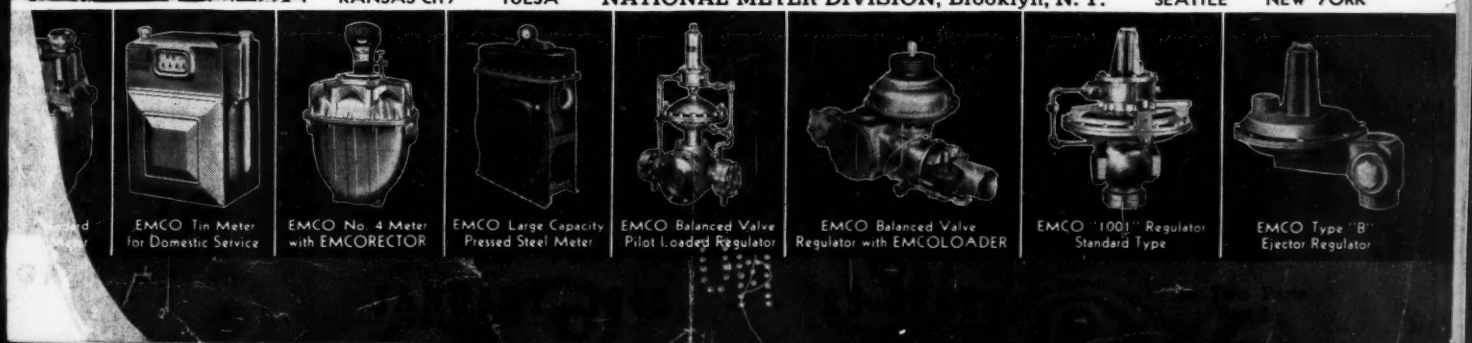

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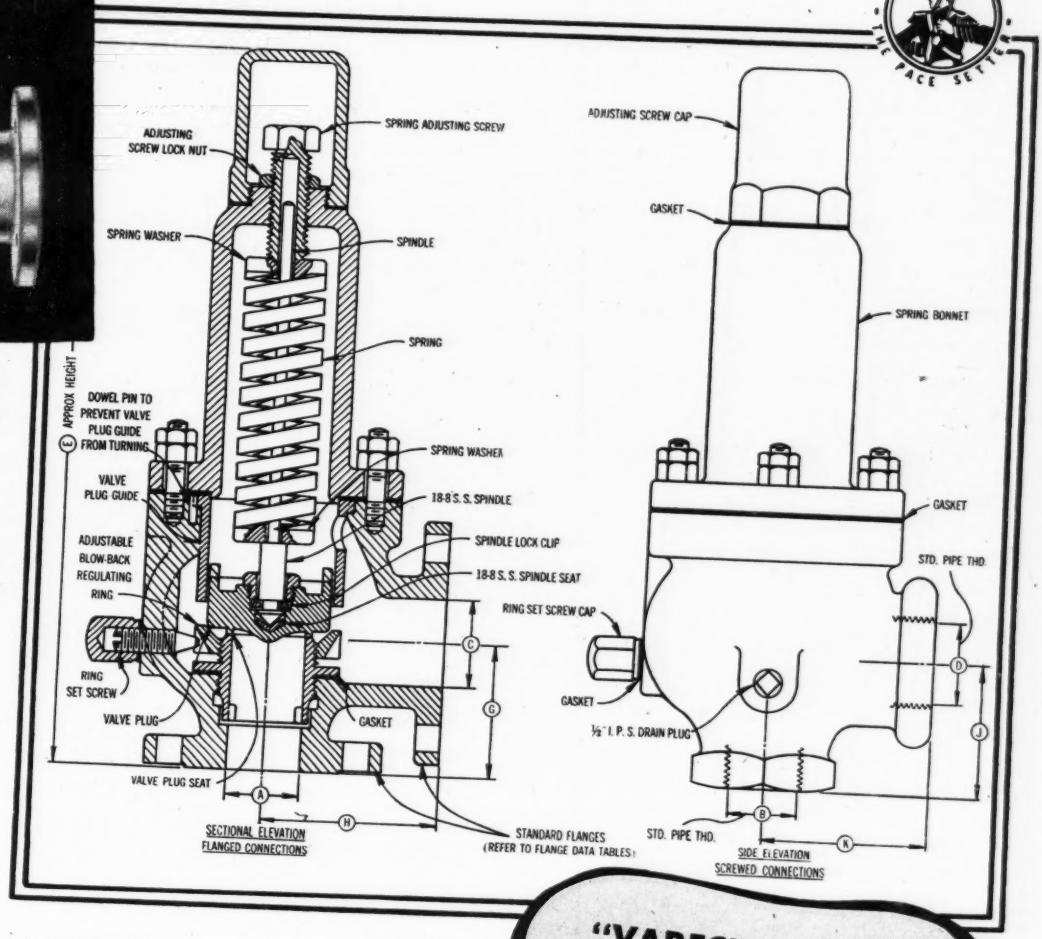

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Twenty First Year of Publication

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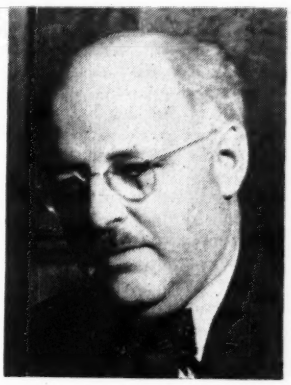
THERMALLY THINKING

By ELLIOTT TAYLOR, Washington Editor

Breathing Spell

FAILURE of the 78th Congress to pass the Overton resolution, empowering the Federal Power Commission to go ahead with its investigation of natural gas industry affairs, cannot be regarded as anything more favorable than a breathing spell until the new Congress gets organized and the FPC gets back on the job of legislative log rolling. It does afford a brief interlude in which leaders of the natural gas industry, if they are so minded, may lay plans to unite in common cause with the many other opponents of Federal intervention in state regulatory affairs.

These groups include the regulatory bodies of practically every natural gas producing state, (Louisiana being one possible exception), the Interstate Oil Compact Commission, the Petroleum Industry War Council, The National Association of Railway and Utility Commissioners, the Independent Petroleum Association of America and no doubt many others of whom we are presently not advised.



Elliott Taylor

We believe that for the industry to stand adamant in opposition to any investigation of its affairs at any time would be both fruitless and politicall inexpedient. But we believe that the natural gas industry has the right to demand that any investigation of the broader aspects of national fuel policies—into which considerations affecting coal and oil must necessarily be integrated—must be undertaken only at the proper time, by a body equipped to make a complete investigation and to act upon the findings once they have been correlated. And we furthermore believe that the industry has a duty to question the motives of any body that seeks to launch such an investigation in this critical hour of our national struggle for survival.

The disrupting effect of a Federal snoop in the inadroit hands of such investigators as the Federal Power Commission, cannot be lightly regarded. Certainly gas producers and gas transmission companies who have been performing daily miracles of public service in the face of manpower shortages, under the impression that it was their patriotic duty, would not regard time spent in assisting such investigators as essential to the cause of an early and complete victory.

In due time, and when it can be undertaken without detriment to our national welfare, the Congress should appoint a committee from the members of both houses, and to that committee should be entrusted a thorough investigation into every phase of our national fuel policies. One fundamental question that the FPC would be neither able nor willing to consider deserves a dominating place in any investigation of natural gas affairs, and that question is whether or not, in the light of its record, the commission should be any longer entrusted with administration of the provisions of the natural gas act.

There is a growing body of important opinion that views with increasing mistrust and alarm the machinations of the FPC, but it has yet to be coalesced into the united front necessary to make its opposition coherent and effective. Any group or committee from natural gas ranks that rises to undertake the responsibility should have the full force of a united industry at its back.

Failure to resist the overweening ambitions of an inquisitorial Federal Power Commission now can well result in the establishment of a sociological dictatorship over the entire oil and gas industry. Such a regime is neither outside of the possibilities nor foreign to the hopes of the present bloc of commissioners.

Completing the Picture

A. G. A. president J. French Robinson's report on "Highlights of the Gas Utility Industry in 1944" provides ample factual and statistical evidence to support his statement that "the gas utility industry during 1944 established new records in the number of customers served and the volume of gas fuel delivered to wartime plants and to homes and commercial establishments".

Since the A.G.A. statistical department at present records only the progress of two of the fuel gas triumverate, manufactured and natural gas, and does not gather or disseminate figures on the new and vigorous liquefied gas industry, we are pleased to advise the association and its members that the other branch of their family tree is doing just as well, and in some classifications even a little better than manufactured and straight natural gas. Our figures are from the current issue of BUTANE PROPANE *News*—the recognized authority of the liquefied gas industry.

For the Total Gas Industry, by which the A.G.A. statistical department unfortunately means only manufactured, mixed and natural gas companies, the gain in domestic customers was 1.9% for 1944 over 1943. For

the liquefied gas industry, this gain was 2.7% during the same period. Total sales of utility gas for domestic consumption, including house heating, according to the A.G.A. figures showed an increase of 8.4% during the year just ended. In that period liquefied gas sales for all domestic uses climbed 12%. Total sales of manufactured and natural gases for all purposes climbed 9.2% but total sales of the liquefied gases marketed as fuel are up 15%. Domestic consumption per dwelling unit for manufactured and natural gases has shown an increase of approximately 6%, while the corresponding increase in sales of liquefied gas per domestic customer is up 8.8%. While it is true that liquefied gas statistics are by no means as reliable as those compiled by the utility gas industry, it is interesting to observe that the trends in liquefied gas—butane, propane and butane-propane mixtures—follow rather closely the curves of the older gas industry. There are now about 9,797,000 domestic customers using manufactured gas, 8,463,000 on natural gas and 1,931,100 homes beyond the reach of gas mains who still enjoy the advantages of a superior fuel through the use of liquefied petroleum gas.

This, we believe, rounds out the statistical information on the whole gas industry and gives a little better appraisal of the true significance of liquefied gas in the national fuel picture. There was a day, we can recall, when the manufactured gas companies more or less regarded themselves as the entire gas industry. Then came the rapid expansion of natural gas. In a few years, that potent newcomer had climbed up to a position of dollar dominance over manufactured gas in every classification and has remained there ever since. Now still another potent newcomer from the ranks of the hydrocarbons is riding across the field.

With more American homes beyond the reach of existing gas mains than are now served by either manufactured or natural gas and all representing a potential market for butane or propane—it would be foolish to deny the forecast of a brilliant future for liquefied gas. Starting its expansion during the depths of the depression, running headlong into wartime restrictions before it was well under way as a fuel industry, it has nevertheless already attracted to its use nearly 10% of all the domestic consumers of any form of gas.

All of which strengthens us in our oft reiterated belief that no cooperative gas industry activity of the future can be considered complete if it leaves out provision for this formidable new factor.

Conservation

SOMETIMES the passionate proponents of natural gas conservation measures give us the impression that their idea of the greatest possible achievement would be to have all gas utilization stopped so that the natural supply may be preserved intact for future generations. And then it would seem to us, future generations having had passed on to them this pristine treasure store, undepleted by human consumption, would be under the most rigid moral obligation to save it in turn for the generations that are to follow them. And thus ad infinitum.

Lost as we were in contemplation of the economy that could be effected if every commodity, every combustible, every benefit and boon from nature's boundless largess were thus impounded for future consumption only, we were brought back to the world of reality by a paragraph in a report recently read before the Interstate Oil Compact Commission, at its winter meeting in Jackson, Miss.

The Regulatory Practices Committee of the Commission is currently engaged in making studies of the economics of natural gas production, transmission and functional utilization, with a view to formulating recommendations that may be adopted by the compacting states which now produce about 80% of the total natural gas marketed. Perhaps better than any other single regulatory body the commission recognizes the delicate balance that exists between the economics of natural gas disposition and that of petroleum production. It recognizes the fact, at times obscured to the Federal Power Commission, that pure social theories cannot be relied upon to bring oil to the surface and leave the gas behind. And it recognizes that what happens to the natural gas that comes to the surface in association with petroleum production depends almost entirely on what that gas is worth. If it commands no better price than ½¢ to 2¢ at the well head it is not worth conserving and no legislative interference with the ultimate disposition of the gas will ever change that simple economic fact. The studies of the oil compact commission's special committee to date have convinced its members that "better prices seem obtainable only through an expanding competitive market".

We are precisely of the same opinion, and we believe that wasteful disposition of natural gas for what may be regarded as "inferior" uses can nowhere be regulated so effectively, and with less injustice and disruption to the economics of both oil and gas production than in the establishing of a fair and equitable price for gas in the field. We believe that an enlightened self-interest should indicate to the natural gas transmission and pipe line companies the desirability of setting up such price structures in their contracts. But in the instances and to the extent that they fail to see the light, we believe the states are justified in passing whatever regulations may be deemed necessary to protect their natural gas resources from wanton wastage, and their own producers and royalty owners from exploitation. Such action has an additional advantage, even from the industry's standpoint, of being the best insurance against continued federal encroachment on state regulatory domains.

Conservation of natural gas can mean many things to many people. To the professional bleeding hearts in the Federal Power Commission it apparently means ultimately doling it out in ever restricted quantities for an ever narrowing range of end uses; to the realists of the oil and gas producing states, it means a rapidly expanding market at better prices that will justify the utilization of the fuel only for economically superior uses, but that will enhance its uses just the same.

The paragraph which convinces us that this viewpoint is shared by the Regulatory Practices Committee of the Interstate Oil Compact Commission, and from which we started to quote in the first place, reads, in part as follows:

> "The life of some of our major fields on the present market outlet will extend over a period of years so great that it may overlap into an era where gas ceases to hold its present rank as a super fuel. . . . a great amount of scientific effort has been directed toward the breaking up of the atom itself. Should success be achieved in this field of endeavor . . . the utilization of gas, as well as other materials for fuel will be superseded entirely."

We are not quite ready to foresee the final obsolescence of all fuels as immediately impending, but we applaud an attitude of mind that admits the possibility that even a substance as modern as natural gas may one day become a matter of only passing historical interest, along with the new deal, bituminous coal and the Federal Power Commission.

THE CANADIAN GAS INDUSTRY
Prepares to Meet the Challenge of Peace

By ROBERT CLARKE
GAS, Canadian Correspondent

IN Canada, gas has met the challenge of war and now is gearing itself to meet the challenge of peace. Our gas engineers, studying prospects for the future carefully, are certain that the role to be played by the industry will be one of importance.

Gas sales in the Dominion reached an all-time high in 1943 at 50,754,497 Mcf for revenue of $30,210,385. Both these totals are expected to be surpassed, at least slightly, in 1944. Figures for the first seven months are the latest available, and they show sales at 32,301,905 Mcf with revenue of $19,101,242.

An idea of the progress made by gas is evident from the fact that, as of Aug. 1, 1944, the industry had 710,871 customers throughout the country—an increase of nearly 12,000 over the same date in 1943. At first glance, such figures may strike American gas men as being on the small side, but remember—Canada is a nation with a population of less than 12 million.

Particularly since Canada entered the war in 1939, the story of gas has been a story of success. So much so, in fact, that a weekly Canadian business paper (Financial Post) was prompted recently to point to what it termed "the remarkable gains in prestige, volume of production and consumption" made by the industry in the past five years.

Future of House Heating

Gas for house heating is believed to have a rosy future, if its growth in certain cities in Canada is any gauge of its coming popularity. Whereas a few years ago it was virtually unknown in Canada for such a purpose, thousands of home now are heated by gas.

Calgary alone has around 17,000 homes heated in this fashion, while Edmonton, another Alberta city, has more than 10,000. Vancouver, in British Columbia, has nearly 900 while Toronto in Ontario, has nearly 1000.

Postwar planning committees of the Canadian Gas Association are studying the industrial materials being made today and likely to be produced tomorrow, deducing their possible effects on the market for industrial gas and appraising the type of equipment and new techniques which will prove of the greatest significance in the gas industry.

According to George W. Allen, CGA secretary, it is felt that steel will remain the leading engineering material despite the advances of plastics, synthetic rubber, plywood, aluminum, etc., even despite the rising curve of the light metals industry.

The CGA expects an increase market for gas in the production and fabrication of steel, especially for new heat-treating operations where the trend has been toward furnaces which require flexible fuel.

Some Canadian gas men see a future for gas in plastics. Hitherto, most plastics, some of which are being used as a coating for such materials as steel and plywood to protect them from corrosion, have been molded at comparatively low temperatures and for this reason steam has been the main source of heat in the plastics industry. Recently, however, reports have been received of plastics capable of being molded only above 400° F. It is felt that a trend towards higher temperature plastics would mean a bright future for direct gas heat.

Gas might even be absorbed in large quantities by the plywood industry, it is felt. Because plywood overcomes some defects of lumber, giving construction greater strength and uniformity in all directions, it may replace lumber to some extent because it lasts longer. Steam heat for binding plywood at relatively low temperatures has hitherto been used, with gas being employed only to produce the steam. However, if plywood is used to surface metal, gas might come to the fore for heat treating or surface covering of the metal in such a combination.

FACTORS POINTING TO FAVORABLE POSTWAR MARKET CONDITIONS FOR THE CANADIAN GAS INDUSTRY.

1. The record of gas engineering in the war has impressed industry as a whole with the value of gas as a precision fuel which offers a wide range of temperature, automatically controllable; and as a flexible fuel which can be adapted to a variety of uses.

2. Deferred demands for capital and consumer goods.

3. Prospects of extensive building and public works programs, which will consume gas.

Aluminum Industry Expanded

Canada's tremendously expanded aluminum industry is considered a fine market for gas. Gas does not figure to any great extent in the actual production of unrefined aluminum pig. Thereafter, though, gas is a vital factor in the aluminum industry, being used in big remelt heat furnaces and in smaller melting furnaces where various aluminum alloys are prepared. Gas is also used extensively to heat treat wrought aluminum for homogenizing, for annealing after cold working, for solution heat treatment and age hardening.

In the magnesium industry, natural gas is a source of heat for the final distillation in the ferro-silicon process, for shock chilling of the magnesium vapor in the case of carbothermic process of manufacture, as a fuel for refining and relining crude magnesium to produce calcium or ingots for cold workings. A market is seen after the war in the field for dry coatings applied to magnesium, because this substance can be coated with a varnish or lacquer or soft or hard rubber.

In concluding this review of prospects for the gas industry in Canada, an observation made by Ernest R. Acker, past president of the American Gas Association, is especially pertinent:

"The industrial gas loads that keep the war furnaces running day and night are the largest ever provided by the gas industry and, together with still further modernized and improved industrial gas equipment, will be foundation for large and important industrial gas loads after the war."

GAS INDUSTRY ACHIEVEMENTS IN 1944

Based Upon the Year-End Report of J. French Robinson, President, American Gas Association

ALTHOUGH 1944 was a year of continued adjustment to an economy of war, the gas industry took stock, scanned its markets and formulated plans for the future. Noticeable throughout the industry was a determined effort to improve the economics of its operations and to expand certain basic activities so that the benefits of gas service may be realized to the fullest extent possible on the domestic, commercial and industrial fronts.

RESEARCH AND PROMOTION PROGRAM

Outstanding development of 1944 was a thorough analysis of the industry and its varied problems by the Postwar Planning Committee of the American Gas Association. This resulted in a plan adopted by the Association's Executive Board to carry out the committee's recommendations to increased research, national advertising and general sales promotion calling for an expenditure of $1,400,000 annually for three years.

PROGRESS IN INDUSTRY RESEARCH

Appropriations were nearly three times higher than for the annual average for the nine-year period, 1934-1942.

American Gas Association Testing Laboratories

1. Major job was the engineering and testing of special war products for the War and Navy Departments, Office of Scientific Research and other Federal agencies.
2. Domestic gas research efforts resulted in (1) experimental development of 100% primary air burner which is expected to result in eventual smooth top range styling; (2) development of single point flash tube ignition for oven and broiler burners; (3) publication of a number of domestic gas research bulletins.
3. Procedures were worked out for testing appliances where high altitudes prevail. The new approval requirements, when adopted, should benefit 1,200,000 customers living at elevations of from 2000 to 7000 ft.
4. With gas predominance in housing project construction, installation inspections rose to the highest point in the Laboratories' history. Nearly 10,000 visits were made, many at the special request of government agencies.
5. By year's end, the Laboratories were recovering from the partial destruction suffered in the Cleveland gas blast.

Institute of Gas Technology

Completing its fourth year of operation, the Institute made strides in development of research projects and in additions to personnel. Leon J. Willien was appointed Associate director. Two major projects in the field of gasification are under way: (1) involves use of a highly superheated steam and fluidized pulverized coal; (2) concerns a continuous gasification system under pressure using "atomized" coal produced by the Institute's newly developed coal pulverizer.

NATURAL GAS

Indications are that the marketed production of natural gas in 1944, including amounts used in the manufacture of carbon black and for field purposes, will reach approximately 3⅔ trillion cu. ft.

Construction: Outstanding development was the completion of Tennessee Gas and Transmission Co.'s 1180-mile, 24-in. line from Texas to the industrialized Appalachian area. Other lines: Cities Service Transportation and Chemical Co.'s 230-mile, 26-in. line; Panhandle Eastern Pipe Line Co.'s 240-mile looping project; Southern California-Southern Counties Gas Companies' 104-mile high pressure La Goleta-to-Los Angeles line, completed this month. Prospective lines include a 1000-mile carrier from Texas to California, another from the Hugoton field to Michigan.

Technical Progress: Important strides were made in the use of natural gas as a chemical agent, for driving gas turbines as a source of primary power. A number of new methods in pipe line construction came to light and methods for storing gas underground were improved.

GAS KITCHENS OF THE FUTURE

An industry-wide kitchen planning program sought for the first time to coordinate the efforts of manufacturers of kitchen cabinets with those of manufacturers of gas appliances to achieve unity of type, size and design, has won the interest of related industries such as steel, glass, plastics, linoleum and others. Gas utilities have indicated their intention to promote such kitchens. The name "New Freedom Gas Kitchen", will be used extensively in national advertising scheduled for early in 1945.

NATIONAL ADVERTISING DEVELOPMENTS

A change of pace in consumer advertising for the first six months of 1945 will consist of two closely integrated campaigns:

1. The first will feature the latest developments and trends in kitchen planning, spotlighting a CP gas range, gas refrigerator, automatic gas water heater. Magazines with a circulation in excess of 18,500,000 will be used.
2. A second campaign will give separate featuring to gas house heating and year-round air conditioning. Magazines having a circulation of 8,430,716 will be used.
3. An enlarged national campaign of industrial and commercial advertising was initiated in September, 1944, in trade, technical and business magazines. Nineteen publications covering the food, chemical, metallurgical, school, general industrial, business fields will be used.

GAS FUEL AND WAR MATERIEL

Gas fuel for industrial heating purposes continues to be used at peak levels with some shifting as demands for various munitions and war products change from time to time. While airplane production in certain classes has been reduced, demand for heavy ammunition and guns has increased to such an extent that peaks of industrial gas demands have again reached new heights.

It is not only the big jobs which demand attention, but the many small ones, particularly when they lead to improvements in process or quality or permit reductions in cost of manufacture or accelerate speed of production.

To cite an example, equipment competitive to the gas industry produced excellent results in speedier heat treatment of various items such as shell noses, gears, etc. This led to a research program which has now culminated

in the direction of high-speed gas heating units, that not only duplicate but exceed the performance previously reported. In fact, so rapid has heating become that it will be necessary to change standards of performance published in guides and handbooks which, in many cases, intimated that metals could not tolerate, without cracking, heating speeds now accepted as commonplace.

The significance of such achievements is not merely measured in terms of greater war output or lower cost of munitions. Faster speeds, lower costs, and far better metallurgical control will be of prime importance in the production of automobiles, refrigerators, radios, and the other peace-time goods now unavailable.

Heating parts undergoing treatment by means of hot air up to 1000° F. in so called "convection" furnaces have been common practice in the past, but today this field has been extended to temperatures as high as 1750° F.

The quenching of metals after heat treatment in oil and water is common knowledge, but today the use of special gas atmospheres discharging from high velocity gas jets as a means for controlled quenching for superior properties is a rapidly growing innovation and a new field of usefulness for gas. In an analogous manner, gas fuel has been applied to the pickling of steel, eliminating the older acid baths and carrying out the entire process in a dry gas atmosphere.

HOME SERVICE ACTIVITIES

During the year, the home service division continued active promotion of the war-time programs of nutrition and food conservation. In thousands of towns and cities in the United States and Canada, Government programs of food, fuel and appliance conservation have been explained through demonstrations, information centers and home calls.

Approximately 12,000,000 customer contacts were made during the year by home service personnel. Special attention has been devoted to "Programs for Young America", designed to meet the special needs of young people who have been shouldered with the home responsibilities of food choices, marketing and preparation.

In the summer of 1944, customer contacts in food preservation totaled six million, requiring the preparation and distribution of two million canning booklets. From contacts made at demonstrations and lectures, telephone calls and personal conferences in local offices and at canning centers, it is estimated that millions of quarts of food have been preserved under the supervision of home service departments of the gas utility companies.

STATISTICAL SUMMARY

Customers: Total at the end of 1944, 19,775,000, the largest number ever connected to the industry mains. An increase of 2.0% over 1943.

Manufactured and mixed gas companies, 10,634,000.

Natural gas companies, 9,141,000.

Revenues: For the entire industry aggregated $1,130,366,000, up 5.7% over 1943.

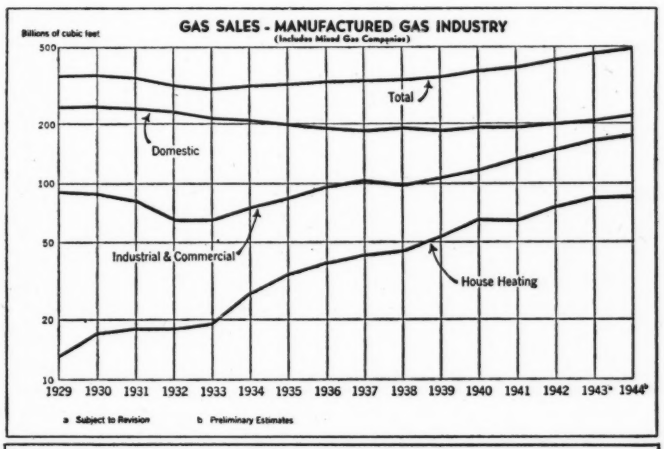
Natural gas companies grossed $682,738,000, a gain of 6.1%.

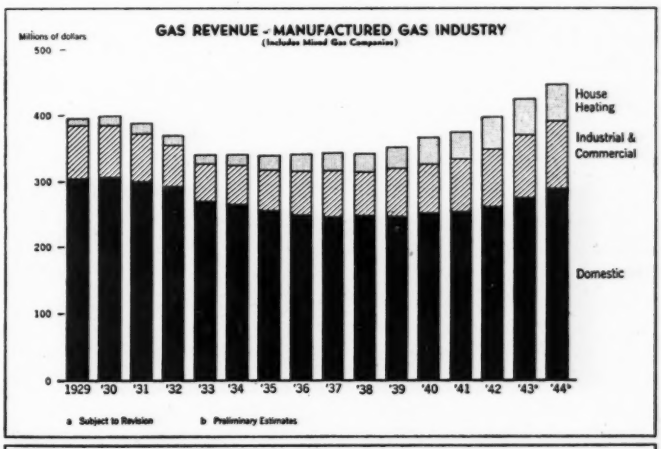
Manufactured and mixed gas companies grossed $447,628,000, a gain of 5.1%.

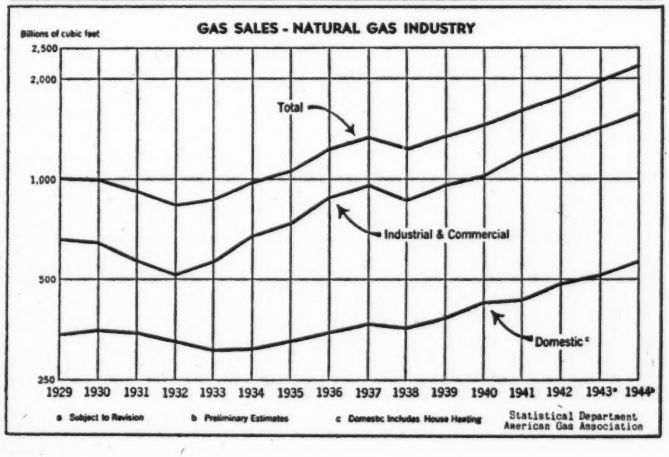
Sales in cubic feet: Industrial and Commercial Sales: Natural gas, 1,182,544,000,000, an increase of 52,664,000,000 cu. ft. a percentage increase of 4.7%.

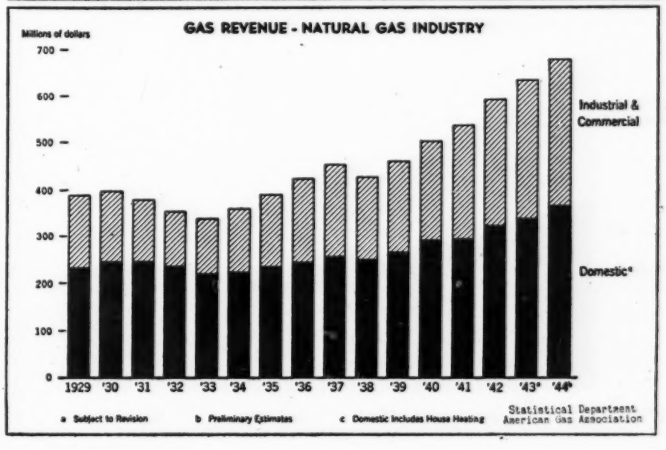
Manufactured and mixed gas, 176,423,000,000 cu. ft. A 5.2% increase over 1943.

Domestic Sales: Manufactured and mixed gas companies sold 306,765,000,000 cu. ft., a gain of 4.5%. Gas consumed for house heating increased approximately 1.2%. Natural gas, 567,417,000,000 cu. ft., an increase of 10.6%.


GAS SALES - MANUFACTURED GAS INDUSTRY
(Includes Mixed Gas Companies)
Billions of cubic feet
Total
Domestic
Industrial & Commercial
House Heating
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943a 1944b
a Subject to Revision
b Preliminary Estimates


GAS REVENUE - MANUFACTURED GAS INDUSTRY
(Includes Mixed Gas Companies)
Millions of dollars
House Heating
Industrial & Commercial
Domestic
1929 '30 '31 '32 '33 '34 '35 '36 '37 '38 '39 '40 '41 '42 '43a '44b
a Subject to Revision
b Preliminary Estimates


GAS SALES - NATURAL GAS INDUSTRY
Billions of cubic feet
Total
Industrial & Commercial
Domestic c
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943a 1944b
a Subject to Revision
b Preliminary Estimates
c Domestic Includes House Heating
Statistical Department
American Gas Association


GAS REVENUE - NATURAL GAS INDUSTRY
Millions of dollars
Industrial & Commercial
Domestic c
1929 '30 '31 '32 '33 '34 '35 '36 '37 '38 '39 '40 '41 '42 '43a '44b
a Subject to Revision
b Preliminary Estimates
c Domestic Includes House Heating
Statistical Department
American Gas Association

CLASSROOM TRAINING Of Domestic Service Men

FOR MORE THAN 10 years the Southern California Gas Company has been developing a program for the quick and efficient training of domestic gas service men. This article describes the evolution of that program. While the classroom training of service personnel is not without its problems, the program has definitely reduced the training period and promoted greater uniformity of operating practice. This material was prepared by the Employee Training Staff and the Publications Department of the Southern California Gas Company and is amplified from an article which originally appeared in a recent issue of the Gas Newsweek Pictorial, an employee magazine of that Company.

THE training experiences of the Southern California Gas Co. in regard to service training have been similar to that of other companies in that it has paced the transition from the "gas man" to the present-day, well-trained and equipped serviceman. The Company's present program has developed over a period of some 10 years and, in order to understand the present training effort, it is necessary to review briefly some of the training techniques that have been employed in the past.

EARLY TRAINING METHODS

The Apprenticeship Principle: Initially, an attempt was made to assure the trainee experience in many fields of the gas business, by adopting the apprenticeship principle. Those programs usually consisted of assigning promising employees various jobs which usually included experience in main and service work, appliance repair and meter repair. This was considered the first major step in the training program because it was the first attempt to control the experience of new employees with a definite end result in view. That type of training gave the new employee a useful background, but the progress towards his ultimate assignment was slow because instruction for his future work was still secondary to keeping him productive during the training period. The necessity for quick replacements and complications resulting from the numerous departments involved made that type of training impractical.

A system which might be termed "working with an expert" was later developed to correct the faults of the previous method. By assigning trainees as "helpers" to these old-time "experts", an attempt was made to capitalize on the store of knowledge contained within that group. However, it was readily evident that these individual "experts" had work habits which were not always desirable to pass on to the new trainee. It was also learned that well-qualified workmen were not necessarily good instructors, and the quantity and quality of instruction given individual students varied widely.

Service Training by Qualified Instructors: Efforts to remedy that situation resulted in the development of a formal training program. Well-qualified instructors were introduced at this point to supplement the limitations of the workmen, who continued to give field instruction. These early instructors, who formed the nucleus of the present specialized training group, introduced various props, such as cut-a-way fittings, appliances and their controls, as well as other visual aids. Training lectures were, for the most part, given "ad lib".

The introduction of instructors marked the beginning of a new trend in training. Prior to this time the student had only been brought in contact with a wide variety of information. No one had helped him assimilate the material or "culled" out the essential from the non-essential. At this point the instructors began to gather the material and organize prepared lectures, with material regarded as non-essential deleted. That early step of centralizing, organizing, and controlling information released as instruction, formed the basis for most developments which have occurred since.

As time progressed, and more instructors were added, the need for a standardized method of presentation became evident as a precaution against offering widely varying work procedures based on each instructor's individual experience. The resulting standardization of material into well-defined lectures further centralized information and made it possible for management and supervision to exercise a greater degree of control over the program. Until this time, management and supervision's influence was exerted in training only in the formation of general objectives and policies. With instructions issuing from one source, it became possible for those groups to indicate within closer limits the information they wished released to the employees.

Training Time Reduced: These experiences and developments resulted in an integrated program which was used with considerable success during 1941, 1942 and 1943. Five hundred and fifty-three trainees received this type of training with reasonable success. Although originally scheduled to cover 90 days, training time was reduced to 80 days and finally to 40 days, as experience was gained and refinements made.

Employees, assigned to the training staff for instruction, attended lectures one day each week and were sent into the field with experienced workmen where they performed those phases of the work they had discussed in previous meetings. Records were kept of each trainee's progress and he was advised periodically of his standing. At the completion of the training course, he went into the field accompanied by an operating supervisor and demonstrated his ability, or lack of ability, in the performance of the work. His training record and his performance in the field were compared against existing standards to determine his fitness for the job.

TABLE 1. NEW OBJECTIVES OF DOMESTIC SERVICE PROGRAM

REDUCTION OF THE TRAINING PERIOD

1. Elimination of needless repetition of simple or unimportant operations.
2. Faster rate of learning due to breaking down the jobs into their component parts.
3. Elimination of distracting factors to promote quicker learning.

PROMOTE GREATER UNIFORMITY OF OPERATING PRACTICES

1. Classroom presentations can be uniformly presented.
2. Only safe, approved methods will be demonstrated to the student.
3. The Standard Practices and Appliance Manuals will guide the new employee, rather than possible erroneous interpretations of older employees.

Lecture and Demonstration Method: Under that type of training, instructors lectured to the students one day each week covering the fundamental principles of operation of the various appliances, and pointing out the service problems which occasionally arise on any type of mechanical device. Information contained in the American Gas Association Appliance manuals, Servel manuals, and those made available by other gas appliance manufacturers, were discussed in detail throughout these classroom sessions.

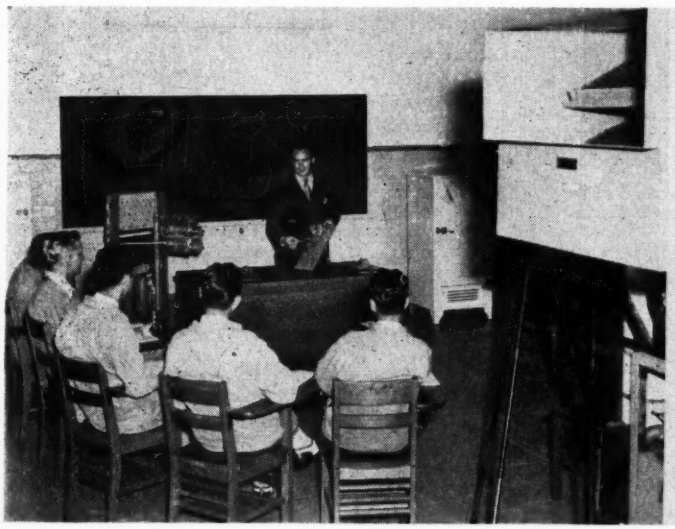
Every representative thermostat commonly encountered in the area served by the company was cut away and mounted on individual standard sized boards. Reference to these individual controls was consistantly made to clarify previous discussions of schematic and "phantom" drawings covering the basic principles of operation. Various types of domestic gas burners were also cut away and mounted individually as supplemental aids in presenting burner design and combustion.

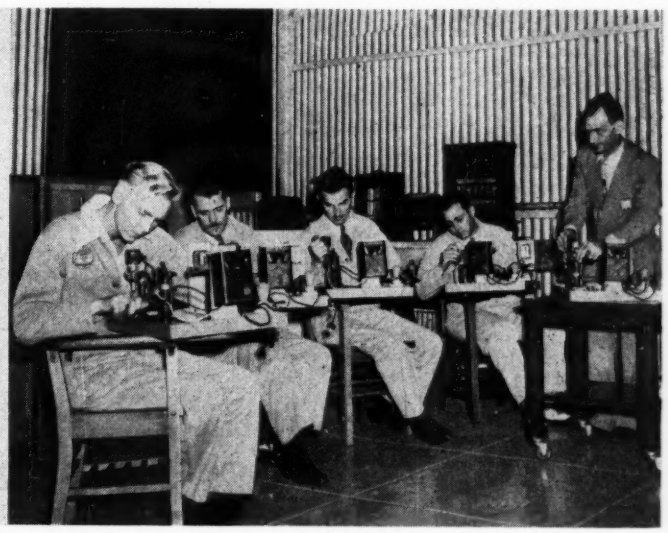
The next instruction step consisted of discussing and demonstrating complete operative assemblies of burners and thermostats for the range, Electrolux, water heater, and furnaces. Finally, a cut-a-way water heater, furnace, range and Electrolux unit were introduced to assist the students in establishing the relationships of all integral parts.

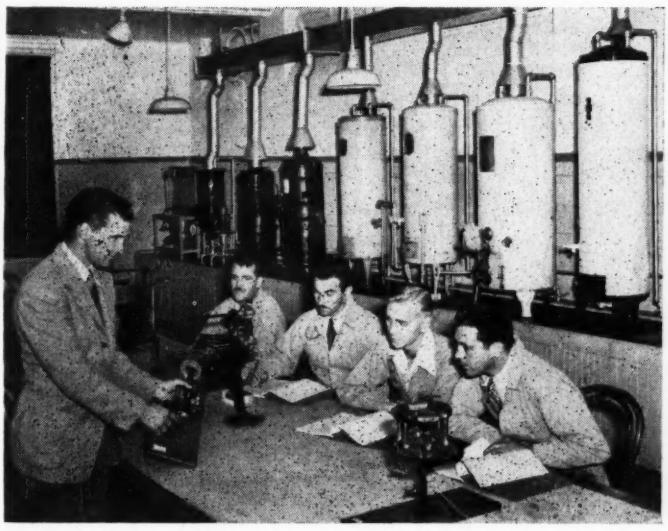
By using the lecture and demonstration method, the various servicing procedures were presented and discussed, but the "know how" in applying that information was still being supplied, as the case arose, in the field by operating servicemen. As a result, students did not always have an opportunity to work on all four major classes of appliances during those seasons of the year when few service problems developed for any one particular class. Consequently, there were students who completed their course of training with limited field experience in servicing heating equipment, for example, while others had too little occasion to service refrigerators. The "know how" phase of such field training also varied according to the particular methods employed by the individual serviceman. Thus, as more critical standards of field performance were established, and the field techniques employed by servicemen were more carefully studied, the range of effectiveness between servicemen became more apparent and a need for a standardized training program became more evident.

As a result of an appraisal of the entire service training picture during the latter part of 1943, it was concluded that little more progress could

AT WORK IN THE CLASSROOM: (Upper left): Instructor A. W. Beck introduces a group to the inner workings of a Servel. (Upper right): Mike Johnstone demonstrates a point on furnace adjustment. (Lower left): H. F. Jacobsmeyer gives instruction in water heater maintenance. (Lower right): A cut-away gas range aids R. E. McKee in driving home a point.







Southern California Gas Co.'s employee training office keeps training records, compiles material, etc. Above, R. C. Terradell, and C. C. Westmoreland, discuss a problem. Other department members seen here include Miss Vivian Holloway, Miss E. D. Perkins, Mrs. M. M. Opie, Miss M. Berger, Oscar Cook and R. MacMillan.

be made because of limitations inherent in the current program. Recent developments and anticipated postwar conditions gave rise to the following objectives which it was felt should be incorporated into present and future training activities.

1. Further reduction of the training period to approximately 24 days to meet the active postwar period when men now on military leave return for duty and when new employees are added to bring the present minimum force back to its normal complement.

2. Further assurance of complete understanding of principles and the development of fundamental skills through incorporation of the technique widely publicized by the "Training Within Industry" program.

3. Greater uniformity of operating practices among the operating group by limiting the student's contact with company operating personnel in order to guide his interpretations of company policy.

CLASSROOM SUBSTITUTED FOR FIELD TRAINING

It was found that the previous program could not be readily adapted to include the objectives. In each case lack of control over the student's field training, which constituted 80% of the training period, seemed to represent the chief weakness of the program. It was accordingly decided that field training by servicemen should be discontinued.

Problems of Classroom Training: The radical change of attempting to train students in the classroom to execute field assignments presented several problems. It was obvious, for example, that field conditions could not be completely simulated within a classroom. It was also equally apparent that students must necessarily have practice on servicing the various appliances that are encountered in the field. The classrooms shown in the accompanying photographs were therefore constructed with the view of meeting that requirement. In each case, representative appliances were installed and used to offer the student an opportunity to overcome the typical problems encountered in the field. The appliances and demonstration models were connected to a supply of gas and are completely operative. The meter set assemblies, on the other hand, are connected to a supply of compressed air, which does not appear to reduce their effectiveness for training purposes.

The fact that all problems cannot be simulated on the training equipment makes it necessary for the student to have a rather sound background of principles which he can apply in meeting the unusual situations which are occasionally encountered. That need has been met by compiling a rather extensive course which includes such general topics as combustion, venting, and fundamentals of automatic controls.

After learning the basic operations of appliance servicing and meter work, the next step is to combine them into various patterns to complete a given type of assignment. Company Standard Practices and Appliance Manuals are regarded as valuable aids to the student in this step; the Standard Practices outlining in detail the service policy of the company while the Appliance Manuals contain information relative to specific appliances. These manuals are viewed as a guide, telling the student where to apply the operations that he has learned.

On the basis of necessarily limited experience to this date, it is felt that these field operations cannot only be taught within the training facilities, but in some respects it can be done more effectively than in the field. This is understandable because the student is not subjected to the distractions encountered in the field which retard the learning process. Also, it is possible to organize the material so that the student can direct his attention toward only one operation until it is completely mastered. Such organization is impossible under field conditions where the student performs the operations as they are encountered. This arrangement also makes it possible to be reasonably certain that the student encounters representative types of field problems.

Application of Training in the Field: The final step is to help the student through the transition period when he begins to apply his training in the field. He is sent into a district with an instructor who helps him "get his feet on the ground" and gives him final instructions. If, in the opinion of the instructor, the student is competent to perform the duties of his classification, he is released to the operating group. His work assignments, reduced in quantity at first, are gradually increased to normal as he becomes more proficient.

This recently adopted plan is still definitely in the formative stage. It has been applied effectively to upgrade employees and to retrain a few men who have returned from military service. Experience in using it to train completely inexperienced people has been limited so that it is not possible at this time to make any conclusive statements regarding the total value of the plan. From the experience gained to date, however, it appears that certain new objectives are within easy reach, (Table 1).

SEASONAL TRAINING

In addition to the foregoing basic training which is administered to all new customer service employees, appliance "brush-up" review classes are conducted for the operating servicemen on a seasonal basis. For example, refrigeration review classes are held in the spring, while heating classes are scheduled for the early fall. Such training, of one day's duration, gives the servicemen an opportunity to refresh their memory on company service policies; add to their existing knowledge; and discuss service problems which may be of special individual concern.

The first such seasonal class followed the lecture, demonstration, and discussion pattern used for new people. The importance of knowing the basic operating principles involved for each class of appliance was emphasized because it was felt that this represented foundation material important to effective servicing procedures.

Subsequent seasonal classes, such as those conducted in 1943, emphasized the mechanical difficulties that occasionally arise in connection with appliance servicing. During that meeting series, operative, representative types were installed and the students were given an opportunity to disassemble and manipulate them at length. The technique used that year required the servicemen to analyze difficulties which had been credited by the instructor prior to the meeting. After identifying and correcting the original difficulties, the servicemen again threw the appliances out of adjustment, introduced other difficulties of their own making, and then traded appliances. In this way, practically every conceivable condition was encountered by the men during the eight hour class.

ANALYZING THE CUSTOMER'S DIFFICULTY

The 1944 seasonal meetings featured analysis of the service difficulty. This approach was chosen because a survey disclosed that servicemen were unduly concerned with what appeared to be a mechanical difficulty in cases where analysis and instruction to the customer would have corrected the problem.

This was particularly true where the Electrolux refrigerator was concerned. It was also seen that servicemen were prone to attempt adjustments on customers' equipment, which, because of its basic design, did not permit satisfactory or adequate performance. Such was the case when appliances designed for manufactured or liquefied petroleum gases were encountered on the Company's natural gas system. It was equally true when off-brand, no-name heating equipment was encountered.

As an illustration of how analysis was featured in refrigeration servicing procedures, seven different operative Electroluxes were used to simulate seven different typical conditions during the 1944 series. Most of the problems were related to customer mis-use or misunderstanding of the appliance. In order to simulate actual home conditions, artificial food was used to pack the shelves with fruits, meats, and beverages, etc., normally found in the refrigerator. The servicemen were then given a set of instructions containing the symptoms as they would be explained by the housewife. They then proceeded to analyze the problem on the basis of the symptoms and informed the instructor of their analyses. (See Table)

Preview of Servel Air Conditioner: During that 1944 series, a portion of the time was devoted to a "preview" of the Servel Air Conditioner. A five-ton unit, installed in the classroom, was explained by an industrial engineer. The objective in discussing this relatively new development was not to equip the domestic serviceman to service this appliance, but rather to prepare them to discuss intelligently the air conditioner with the customers when questioned about it on routine service calls. Thus, in anticipation of the day when these air conditioning units will be installed in great number, the domestic servicemen will at least be qualified to light the appliance and put it into operation.

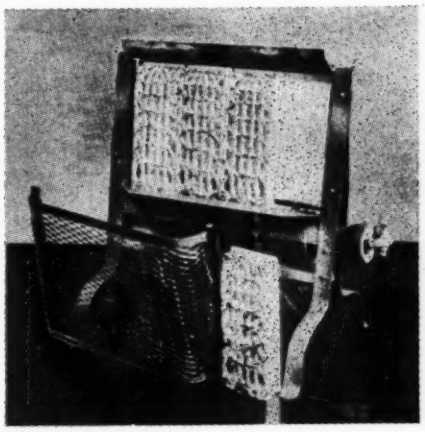
As a result of training, the refrigeration "specialist" of yester-year, whose "magic touch" was required to service refrigerators, has been replaced by the present-day operating servicemen who service refrigerators as a matter of routine. Not only have all operating servicemen been qualified to service refrigerators, but recent surveys of their effectiveness indicate that the Servel refrigerators are actually less bothersome from the service standpoint than some of the other more common and simple appliances.

DEALER TRAINING

In keeping with the company's policy of cooperating with plumbers and dealers and other service organizations, considerable time has been spent in training their personnel in the correct procedure used in servicing gas appliances. As a result of this training, certain groups within company operating territory have been qualified to install and service all types of gas appliances.

The large increase of population in Southern California has resulted in the erection of several large Federal Housing Units in which gas appliances were specified. Those appliances were sold directly to the contractor and, therefore, did not go through a dealer's warehouse where appliances are usually serviced prior to installation. Initially, the service personnel of those housing units were having difficulty in putting those appliances into satisfactory operation, with consequent numerous service calls being received

HEATING MANUAL		SECTION:	5 - Portable Space Heaters
ISSUED:	September 15, 1943	PAGE NO:	23
SUBJECT:	FLAPPER RADIANT HEATER		



Construction Features

Gas is supplied through a fixed orifice.

The input is controlled by a blunt needle valve located in the gas cock.

Primary air is adjustable.

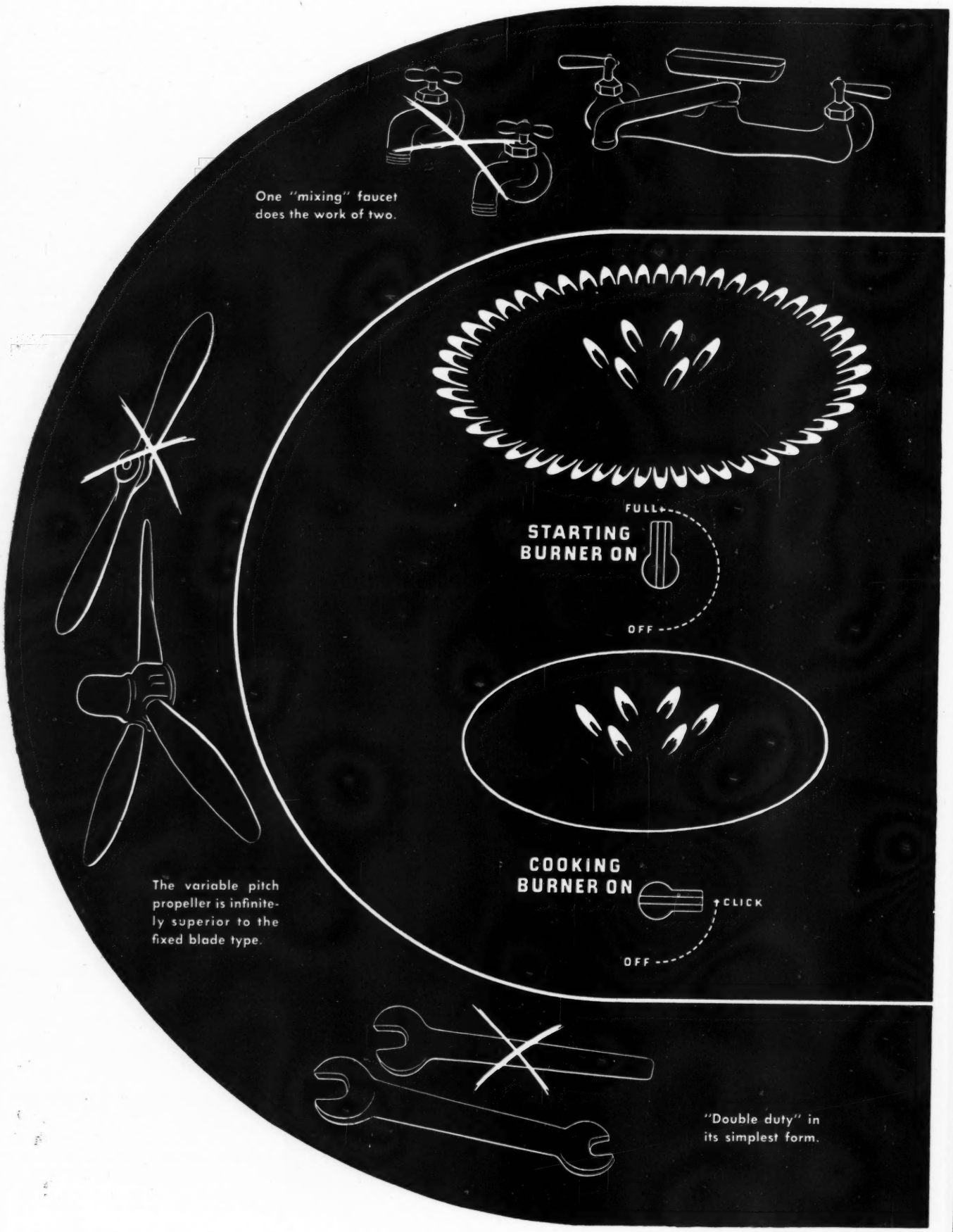
The burner contains three rows of drilled ports.

A machine screw enters the bottom of the venturi about 2" from the mixer face.

The radiants fit close to the burner.

Sample page from Southern California Gas Co.'s Heating Manual.

What will the gas range of


One "mixing" faucet does the work of two.
FULL
STARTING BURNER ON
OFF
COOKING BURNER ON
CLICK
OFF
The variable pitch propeller is infinitely superior to the fixed blade type.
"Double duty" in its simplest form.

by the company. Classes were therefore held for the maintenance people of the housing group, in which the proper servicing procedures were thoroughly discussed and demonstrated. Following this, the service calls for the Federal Housing Units dropped sharply, much of which improvement may be attributed to the resultant better qualified maintenance personnel.

THREE VIEWPOINTS

Through research and precision manufacturing methods, the gas appliance manufacturer has built into his product more speed, satisfaction and efficiency than ever before. Yet, much of this merit can be cancelled out by improper installation and adjustment.

The dealer, too, is interested in the proper installation of an appliance which can keep his salesman's promises—if given the chance.

And, finally, the utility has an active interest in the degree of satisfaction which its customers experience. It is well aware of its responsibility of providing a dependable supply of uniform quality gas, at a constant pressure, but it also knows that the proper utilization of this gas depends on how good the customer's equipment is, and how well it is installed and serviced.

ANALYSIS OF SEVEN SERVICE PROBLEMS ON THE SERVEL REFRIGERATOR

PROBLEM	*CUSTOMER'S STATEMENT*	*SERVICEMAN'S ANALYSIS (Or Conditions Found)*	*REMEDY (Or Correction Which Should Be Made)*
NO. 1— Water-Cooled	"The freezing unit drips water in the day time, but the refrigerator freezes over-night. It is slow in freezing ice cubes during the day. This refrigerator has been used at the same location for the past 10 years. It began acting up about a month ago. We haven't changed our living habits or bought any unusual amount of food."	Found burner orifice clogged with foreign material resulting in insufficient input into the burner.	Clean orifice.
NO. 2— Air-Cooled	"I notice an odor in the kitchen near the Electrolux that burns my eyes."	Found the burner out of alignment resulting in flame impingement on the generator causing an odor.	Re-align the burner.
NO. 3— 500-A Air-Cooled	"I recently moved from Victorville bringing my household equipment, which included my Electrolux, because my husband got a good job at Cal-Ship. I've always had excellent service from the Electrolux in Victorville from the day it was installed. However, since we've been here it has gone out four times during the past week. My husband thinks the movers did not install it correctly. Will you examine the connections and see whether anything is wrong?"	Found tank gas burner installed on the refrigerator.	Change the burner.
NO. 4— Water-Cooled	"I think there is a water leak in my Electrolux because I always find water in the bottom of the food compartment."	Found the door gasket deteriorated, allowing air to leak into the food compartment.	Install new door gasket.
NO. 5— Water-Cooled	"I am starting to have the same trouble with my Electrolux that I had last summer. It freezes satisfactorily at night but partially defrosts during the day time. I thought that the Gas Company man who worked on it last fall had overcome the trouble because it operated satisfactorily all winter. During the last hot spell, it started all over again, so I called the Gas Co. Another man went over the Electrolux completely. It looked like he was over-hauling the entire box. He disconnected the piping down here and let water run into a bucket."	Found the rectifier excessively hot, indicating a weak unit.	Install new unit.
NO. 6— Water-Cooled	"I think there is something wrong with this Electrolux because I have had milk sour several times; the butter gets soft, and vegetables wilt. It makes marvelous ice cubes, but it won't freeze fruit juices."	Found improper placement of foods and wax paper on shelves of the food compartment restricting the normal circulation of air within the refrigerator.	Explain proper food placement to the customer.
NO. 7— Air-Cooled	"I think there's something wrong because my Electrolux defrosts by itself. It's working all right today though. Can't you stop this Electrolux from defrosting so easily? Is this due to a shortage of gas?"	Found excessive frost accumulation on the chilliator, insulating the thermostat bulb.	Explain need of periodic defrosting to the customer.

RADIANT HEATING
For Industrial Processes

Radiant vs. Convectional Heating

EXCERPTS FROM an article, "Radiant Heating for Industrial Purposes—Infra-Red by Gas" by L. W. ANDREW and A. C. CHAMBERLAIN, Gas Light and Coke Co., Watson House, London, England, re-printed in the "Institute of Fuel War Time Bulletin," Oct., 1943. This subject is further covered in an article, "Infra-Red for Industrial Purposes," published in G A S, Oct., 1943, p. 47.

THERE are many industrial processes for which radiant heating or infra-red offers a substantial advantage over convectional heating methods. The fact that radiant heating and infra-red heating are identical and that industrial gas appliances have made considerable use of radiant heating should enable the engineer to appreciate the uses of infra-red.

The gas industry has available methods of providing radiant heating which because of their advantages in range of intensity, simplicity, ease of application, maintenance, capital, and operating cost, offer opportunities for extensive development in industrial heating processes.

It is important, however, to use infra-red heating for its proper purpose and not to attempt to use it where convection heating would be preferable. In order to achieve this object the principles of radiant heating must be clearly understood.

Generally speaking, radiant heating offers a simple way of getting a high rate of heat transfer to an object which requires heating. It is therefore possible to obtain a very rapid heating up of the object, and often the object is removed from an intense zone of radiation long before the ultimate temperature is attained, and then allowed to cool, or transferred to a less intense zone.

Any process which can be carried out in a short time at a high temperature instead of in a long time at a low temperature is particularly suited to the application of infra-red rays. It is important that there should be the minimum "shadowing" from the radiant heat on any part of the object to be heated, and also that objects given the same treatment should be of reasonably similar weight, surface area ratio and reasonably symmetrical in shape and uniform in thickness. It is a matter of trial to find out to what extent conductivity of the material will smooth out temperature gradients due to variation in local shape and thickness.

Practical experience shows that radiant heating can be applied successfully to many conveyor ovens used for paint and other drying processes, but is normally unsuited to the batch type of oven. It has also become clear that the possibility of increasing the normal temperature of convector ovens should be considered as a method of speeding up the drying of paint—care must be taken, however, to avoid spoiling of articles unshielded from the walls of the oven.

Finally it should be remembered that the choice of the best type paint may be of fundamental importance in dealing with a paint drying problem, and here the paint manufacturer can be of the greatest help.

Practical Sources of Infra-Red Rays

A source of infra-red rays is simply a source of radiant heat giving radiation mainly of wave lengths longer than those visible to the human eye, i.e. longer than about 7000 A.U. All the familiar radiant heaters, gas fires, gas grills, electric fires, electric bulbs, etc., emit nearly all their radiant energy in the infra-red region.

The practical problem is to produce radiation economically; this radiation must give a suitable and reasonably uniform intensity over the whole surface of the object to be heated, and it must be substantially absorbed by the surface on which it falls.

The maximum economy of space would be obtained if the object were surrounded by radiating surfaces following its own contour and placed close to it. From a practical point of view a reasonable clearance is needed between the source and the object in order to widen the scope of any one unit to deal with objects of different size and shape.

Simple shapes of unit will normally be satisfactory, for example vertical walls or parts of a spherical shell.

If sources of large area are used, each application must still be considered on its own merits, and the size and shape of the unit should be as simple as possible, e.g., sheets of metal can readily be heated between vertical walls, whereas a curved shape is generally desirable if the object to be heated has a depth of the same order as its width and height.

With metal objects the high conductivity is sufficient to even up minor temperature gradients, and little difficulty occurs so long as the radiating surfaces are reasonably even in temperature. The problem of design is more critical if objects of a low conductivity material, such as wood, are to be heated on the surface.

The electric type of unit with large numbers of lamps at the focus of parabolic reflectors needs a very careful arrangement and adjustment of over-lapping beams in order to obtain uniformity of heating and con-

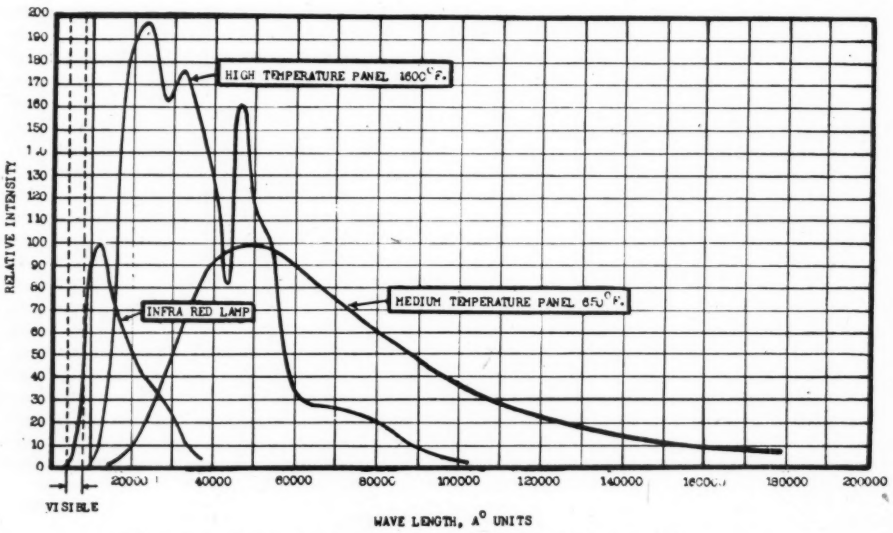


FIG. 1 Energy distribution for gas and electric infra-red units.

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We wish to express our appreciation to our friends in the Gas Industry, and want to assure you of the best possible service that wartime conditions will permit.

We thank you in behalf of our Organization and wish a

. . . Happy New Year

. . . TO ALL

THE SPRAGUE METER CO.
BRIDGEPORT, CONN.

siderable stress is laid on the importance of getting the right configuration of unit for a particular job

For gas sources, practical experience has shown that a unit with large radiating surfaces of two semicircular sections facing each other, having a radius of 16 in. gave excellent results on thin metal sheets 2 ft. square, on metal cans 2 ft. high, 1 ft. 6 in. wide and 6 in. deep, and on heavy tapered castings of cylindrical shape 1 ft. in length with a maximum diameter of 4 in.

For certain types of work where the objects may be irregular in shape and thickness, and there is little margin between the drying temperature and the spoiling temperature of the paint, it may be desirable to take advantage of a variation in radiation intensity over different parts of the object or it may be necessary to produce a high overall radiant intensity for heating up, and a lower radiant intensity to maintain a temperature obtained quickly by high intensity. sity.

The electric type of unit can readily obtain local variations in intensity by adjustment of reflectors and spacing of the small units, but it is a matter of adjustment by a skilled person to obtain such results. A less drastic change in intensity can be obtained on a gas-heated unit by modifying the surface temperature of the unit either in a vertical plane or a horizontal plane as required—an easy matter in the initial design of the unit.

It is also easy on a gas-fired unit to lower the gas rate and hence the average surface temperature and radiant intensity of a whole unit or a section of a unit, while local changes in emissivity can be achieved by painting the normally black surface with heat resisting aluminum paint.

The absorption of radiation by a surface depends on the emission spectra of the radiation and the characteristics of the surface; if the surface is painted then the absorption characteristics of the paint, i.e., the vehicle and the pigment, generally play the most important part in determining the degree of absorption obtained.

All the practical sources of infra-red suggested at the moment have a continuous type of spectrum, although the energy emitted will reach a peak at a wave length depending on the temperature of the source—the higher the source temperature the shorter the wave length at which this peak will occur.

Curves (Fig.1) compare the emission spectra of a source at 650° F, 1600° F, and the electric tungsten infra-red lamp.

Industrial Finishes on Metal Objects

EXCERPTS FROM Ammunition Letter No. 1. Committee on Heat Treating with Gas, "Industrial Finishes," CARL H. LEKBERG, Northern Indiana Public Service Co., Hammond, Ind., Chairman. Presented before the Industrial and Commercial Gas Section, American Gas Association, June 26, 1944.

THE Committee on Industrial Gas Research of the American Gas Association has conducted extensive tests on the comparative effectiveness of baking industrial finishes with infra red electric lamps, convection ovens and radiant cup gas burners. Somewhat similar tests were conducted in England and partial data are in the hands of the committee. Some rather startling results from these tests are shown in Table 1. In studying these data the following points should be borne in mind.

1. These tests have to do exclusively with the curing of industrial finishes on metal objects.

2. Finishes that cure by oxidation are not suited for short cycle curing because the safe temperature to prevent spoiling of the finished is comparatively low, and the process itself requires a comparatively long time. However, as shown in the tests made in England, some improvement can be made through faster heating of the material.

Finishes that are produced mainly through the evaporation of a solvent are not susceptible to much improvement in the time cycle for the same reasons.

Polymerizing finishes are best suited for short cycled curing because the curing time is a function of the temperature of the work piece.

3. The data on infra red drying was collected from tests run on the best type of infra red lamps available at the time, set up according to the manufacturer's recommendations.

The optimum distance of the lamps from the work was established by preliminary tests as the shortest distance at which the finish was not spoiled.

The data on convection heating is based on an oven of the same length as the infra red lamp bank provided with means for operating at different air temperatures and various rates of flow (air velocities).

In order to get a comparison between radiant cup burners and infra red lamps as to the relative effectiveness of the radiant energy from the two sources, the products of combustion from the former were excluded by the interposition of pyrex glass shields. These absorb in some cases up to 60 to 70% of the radiant energy, and are therefore probably not practical in most industrial applications. The test data submitted herewith are on the basis of operating the cup burners the same distance from the work piece as the infra red lamps.

As indicated in Table 1, some tests were also conducted without shields.

4. In short cycle curing, the metal temperature reached at curing time

TABLE 1. COMPARISON OF CURING TIME AND PRODUCTION CAPACITY

Die Casting—Weight .51 lbs.—Outside Surface 18 sq. in.—Thickness 0.125 to 0.188 in. Finish—Fast Polymerizing White. Convection Oven—Air Temp. 600° F.

Heat Source	*Curing Time Minutes*	*Production Capacity Pieces Per Hr.*
Infra Red Lamps—250 Watts each	19.00	213
Infra Red Lamps—375 Watts each	16.00	253
Convection Oven—Air Temp. 300° F. Air Vel. 1200 ft. per min.	3.25	954
Convection Oven—Air Temp. 400° F. Air Vel. 1200 ft. per min.	1.75	1472
Convection Oven—Air Temp. 500° F. Air Vel. 1200 ft. per min.	1.25	1800
Convection Oven—Air Temp. 600° F. Air Vel. 1200 ft. per min.	1.00	2025
Convection Oven—Air Temp. 400° F. Air Vel. 800 ft. per min.	2.40	1190
Convection Oven—Air Temp. 600° F. Air Vel. 800 ft. per min.	1.30	1760
Shielded Radiant Cup Gas Burners Hot Face Temperature 2030° F.	9.00	450
Shielded Radiant Cup Gas Burners Hot Face Temperature 2185° F.	5.40	750
Unshielded Radiant Cup Gas Burners Hot Face Temperature 2185° F.	1.80	2250

(Calculated from data on sheet metal of various thicknesses)

is less than the oven temperature in the case of convection heating or the ultimate maximum temperature obtainable with long exposure before infra red lamps or radiant gas burners. This "thermal head" is the secret of short cycle curing and must be combined in the apparatus with cycle control of the work in order to provide the proper time of exposure.

5. It should be borne in mind that these are research test data and cannot be directly applied to specific operations. For instance, the rates of production shown would not fit any other apparatus than that on which the tests were made. Furthermore, the curing times will apply only to the particular materials tested. However, the superiority of gas either in the form of radiant energy or of convected heat is so pronounced that even considerable deviation from the results tabulated will not detract materially from the superiority of gas.

6. It will be noted that the oven air temperatures (convection heating) have a quite marked effect on the curing time. An analysis of several curves indicates that the curing time varies inversely as the 1.8 power of the ratio of the oven temperatures in excess of 150° F.

$$\frac{\text{Time } 11}{\text{Time } 1} = \frac{(\text{Temp. } 1 - 150)^{1.8}}{(\text{Temp. } 11 - 150)}$$

7. It will also be noted that increasing the air velocity was effective in decreasing the curing time.

8. Production capacities are calculated from the data on curing times and the production capacity of the Infra Red Lamp bank using 375 watt lamps, and applies to a convection oven or a bank of Radiant cup gas burners of the same length (conveyor travel) as the Infra Red Lamp bank (14.125 ft.) In the case of the convection oven, one minute is added to the curing time to provide for preheat. These capacities are for straight line production and can be increased by the use of multiple lines in the convection oven because with this heat source there is no shadow effect.

It should be borne in mind that the calculations are theoretical and practical applications will be influenced by such factors as shape of pieces, ease of handling, ventilation requirements, etc.

RADIANT HEATING is a load which has been largely appropriated by the electric industry, yet radiant or infra-red heating by gas is often superior to that furnished through electric infra-red lamps. Gas radiant heat producers are more flexible both for focusing on and coverage of the heated load and are, in addition, subject to any desired degree of turn-down. This topic was previously touched upon in GAS in the Oct., 1943 issue, page 47.

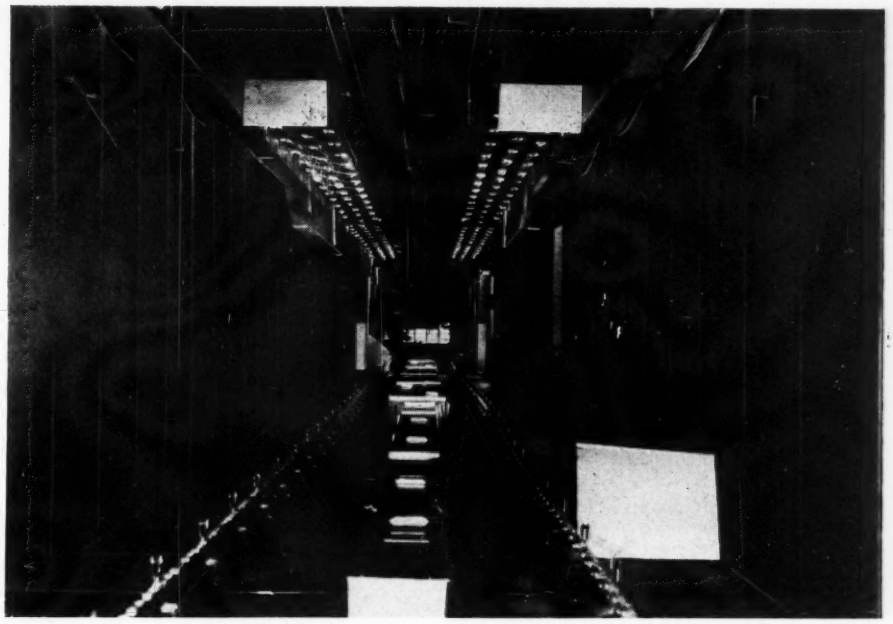


FIG. 2. Infra-red gas burner equipped oven at the Hayes Mfg. Co., Grand Rapids, Mich.

"Infra-Red" Paint Drying With Gas

WILLIAM H. TESMER, chief engineer, Burdett Manufacturing Co., Chicago, Ill.

WITH "Infra-Red" heat processing playing so important a part in today's efforts toward both quantity and quality production, it seems only fitting that this subject should be carefully viewed from all angles.

This article deals directly with the operation and results obtained by the refractory type "infra-red" burners. This type "infra-red" burner, when employed with a recirculating system as in paint drying, will offer decided advantage such as 90% lower fuel cost, and will provide up to 300% increase in production, as compared with old methods of drying, without reformulation of paints.

In the case of ammunition chests and similar metal chests, the refractory type "infra-red" burner will dry the inside finish with equal speed and thoroughness as the outside, simultaneously. Similarly wrinkle, hammerloids, clear, black and white finishes can be run through side by side, in the use of refractory type burners, with perfect results requiring no change of speed or temperature.

With the refractory type burners the recirculation of hot air not only aids the speed of production, reducing fuel consumption at the same time, but provides a pure oven atmosphere continuously drawing all foul air out.

Summing up the most important advantages of the refractory type "infra-red" burner, it can be said that:

1. Fuel consumption is unbelievably low.
2. Reformulation of paints for use under this drying system is not necessary.
3. Size and shape of work being processed has no bearing on speed and results.
4. It is not necessary to focus burners on actual surface, which is a requirement in the use of lamps.
5. Pure oven atmosphere is always present.
6. Wide range of colors, finishes, shapes and sizes can be run through simultaneously with excellent results.
7. Temperature from 150 to 550° F., can be obtained by merely resetting temperature controllers allowing a wide range of temperature and types of production without changing speed of conveyor.

The "infra-red" gas burner equipped oven (Fig. 2) of the Hayes Mfg. Co. of Grand Rapids, Mich., is chosen for discussion, because this installation is a conversion job and offers excellent testimonial. The Hayes oven has been operating for approximately two years, including Sundays and holidays, without requiring maintenance.

This oven, originally constructed to meet the specific requirements of Hayes production, was indirect fired before conversion. It measured 180 ft. long and had a floor conveyor that traveled 24 in. per minute. The paints used under these conditions were formulated for a cycle of 1½ hours at 300° F.

Conversion of this oven to employ Burdett "infra-red principle" gas burners as shown in Fig. 3, cut 100 ft. from the length, making its overall length 80 ft. counting the 10 ft. vestibule air seal at each end. Two overhead monorail conveyors, travel-

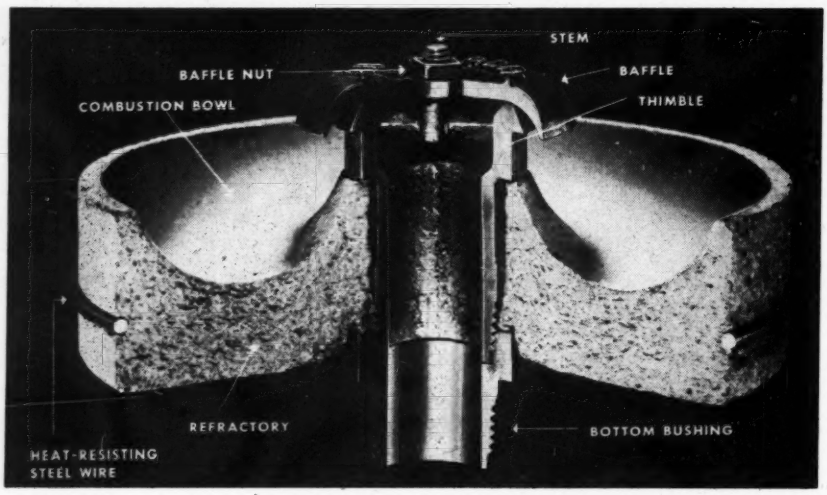


FIG. 3. The Burdett "Infra-Red Principle" burner.

(1) These burn any commercially available gas from manufactured to hydrocarbon gas with as high as 40% economy in fuel consumption.

(2) No carbon deposits—no foul ovens—always a clean oven atmosphere.

(3) Production increased up to 300% in paint drying.

(4) Size and shape of pieces have no influence on uniformity of cure.

(5) All varieties of colors—white, green, red, purple, tan, etc., finished simultaneously without discoloration, loss of sheen or checking.

(6) Rough and polished surfaces, thick and thin materials, are all finished with equal success.

(7) Single-line or grouped piece production handled with equal success without adjustment of equipment.

(8) In food processing—better retention of food values and flavors, and little or no shrinkage.

Construction and Operation: The burner head consists of only three parts: refractory, thimble and baffle. The refractory is made of aluminum clay, which in its wet stage—prior to molding and baking, is mixed with sawdust. The molded refractory is baked at a temperature of 3100° F., burning out the sawdust and leaving the refractory porous and capable of withstanding the operating temperature of 2300° F., indefinitely. The thimble and baffle are fabricated of nichrome. The threaded bottom bushing connects the unit to the fuel manifold. The concave refractory disc serves as combustion chamber. On this disc, complete and instantaneous combustion takes place. A controlled air-gas mixture fed into this refractory bowl, or combustion chamber, creates a radiant glow (no actual flames are discernible), with an operating temperature of 2300° F. The gases scour down and outward to the edge of the refractory disc, and in less than 45 seconds the operating temperature (2300° F.) is attained from a cold start. The radiant surface is maintained at low turndown in addition to the ability to operate on wide variety of gases.

Flexibility: The burners are employed in both high and low pressure gas applications. In the high pressure fields (high pressure gas, or pressure pre-mix gas), they have proved successful with the use of an inspirator for supplying the proper amount of air, thus eliminating the necessity of a low pressure blower and motor. In the low pressure applications, the necessary air is supplied by a low pressure blower, wherefore, atmospheric conditions have no effect on combustion and a perfect mixture is maintained. These burners are operating in many industries under full automatic control, lending themselves ideally to "off" and "on," as well as "throttling action" or "high-low" automatic control. A number of burner heads may be assembled on one manifold, making it possible to handle installations of many different types and sizes. The burners are made in sizes ranging from 2½ to 12 in. in diameter, with capacities from 10,000 Btu.'s to 150,000 Btu.'s per hour.

ing in opposite directions, were added, having a top speed of 10 ft. per minute and low speed of 8 ft. per minute. They are actually operating at 9 ft. per minute under normal conditions. The floor conveyor that is used for very heavy products, travels at 10 to 14 ft. per minute. This oven operates four manifolds, each 25 ft. long—two manifolds on each side of the oven occupying 50 ft. in length.

Greater flexibility, than found in this oven, is not possible. It will handle anything within the scope of the annual production of the Hayes plant from 150° F, to 450° F. Any temperature change, either up or down can be accomplished in 7 minutes, permitting a complete paint change within that period without stopping the line of production. Hayes has also found that they can run their wood parts with the same ease and excellent results as their steel and aluminum parts.

It will be noticed that the conveyor speed will not permit the cure cycle to be longer than 6¼ minutes in the heat zone or 10 minutes overall, which is a long cry from 1½ hours as formerly required.

The original paint formula as perfected for the old method of production, is still used.

Production at Hayes includes such as bomb finns, plywood and oak seats, radiator core housings, automobile fenders, fender brackets, radiator shells and a range of hardware items which represents real flexibility. The total weight run through the oven is 46,375 lbs. per hour. They have never experienced any temperature drop, regardless of the size or kind of load. They state that they have never been able to match colors on parts as evenly as they have since the conversion of this oven to employ Burdett "infra-red principle" gas burners.

The Hayes Mfg. Co. is at present including many items in their postwar plans that they have been afraid to cope with in the past, purely on the strength of this oven performance.

The British "Black Emitter" Unit

EXCERPTS FROM an article, "Infra-Red by Gas—The Gas Light and Coke Company of London's 'Black Emitter' Unit," published in February 26, 1944 issue of the "Gas Times," 29 Grove Road, Leighton Buzzard, Beds., England.

ONE of the most remarkable technical developments by the gas industry during war time has been the introduction of gas for infra red. Though the spur to progress may have been the fine achievement of our electrical friends, the gas industry has been able to develop apparatus along its own particular lines and has in no way been forced into the role of imitators.

The Gas Light and Coke Co. of London reports that since August well over a hundred practical demonstrations of black emitter unit have been given, and that it has been impossible to keep pace with the orders received. That there has been no slackening of interest, in fact there is every indication of greater interest, shows how successful the preliminary development has been. All the experience so far has fully confirmed the initial optimism regarding the use of gas

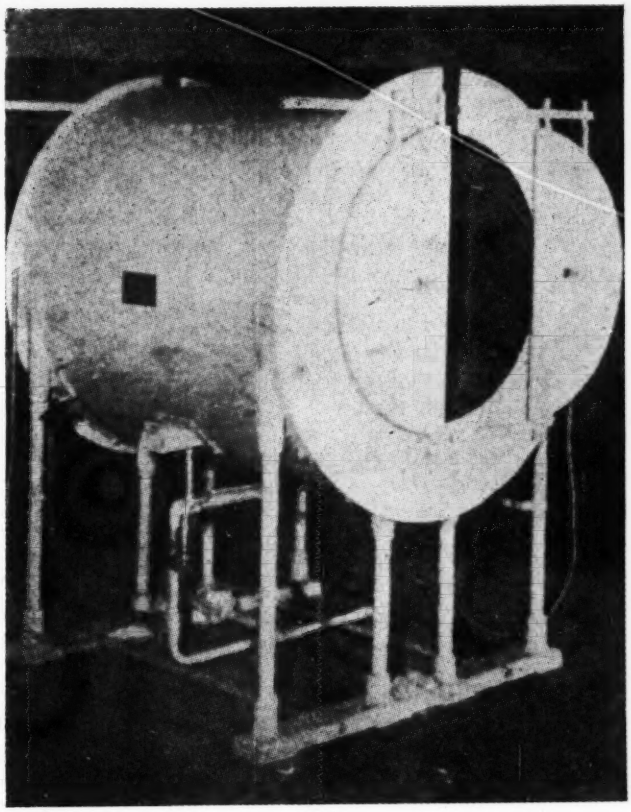


FIG. 4.
"Black Emitter" tunnel designed and produced by The Gas Light and Coke Company, London.

as a source of infra red, and the field for future development has become clearly defined.

In Fig. 1 is shown the latest "black emitter" tunnel designed and produced at the G.L.C. industrial gas centre. The single unit shown has been supplied to the most important paint manufacturers in South East England for laboratory control, and that paint manufacturers should have found it necessary to install such equipment is a clear indication of the interest shown by paint users in gas infra red.

Several similar units up to 12 ft. long have been installed for production with complete success; output has been greater than estimated and where strictly comparable figures are available the cost of stoving has been lower than for convection ovens, while the convenience of a continuous flow system as compared with batch stoving in a convector oven has resulted, for one manufacturer, in a 60% increase in output without increase in labor. A diagram of a 4-unit "black emitter" tunnel is shown on Fig. 2.

Stoving Times

Gas infra red has already shown that stoving times faster than electric infra red can be achieved; for certain work this is important, but experience has indicated that for certain properties, e.g. highest class finish and extreme durability, speed is not a primary consideration, and that instead of, say, 90 seconds at high intensity, three minutes at a lower intensity produces a superior result.

It is here that the gas panel has great advantage over the electric system, for continuous control of intensity from 0 to 5000 Btu. per sq. ft. per hr. can be achieved simply by adjusting the gas pressure on the gauge supplied with each unit, without the need for readjusting lamp contours or refocussing. This simple control of intensity has received wide praise and is one of the oustanding advantages of the gas heated black emitter.

This ease of control has proved most important in the stoving of shrivel finishes, which must be baked slowly at first until the shrivel has "set," after which a high intensity can be used to complete the stoving in the shortest possible time.

Other Applications

The use of infra red in the plastics industry already shows important improvements over present methods of heating. The softening of compressed powders prior to moulding has been successfully achieved, where the thickness of the pellet does not exceed 3/8- in., while the use of the long infra red rays emitted by the gas unit has solved a most difficult Perspex moulding operation, when short wave electric infra red has failed.

It has been found possible to dry certain phenolic resins by infra red, when all other methods had failed to produce a product with the required physical characteristics and where once again electric short wave infra red had been tried without success. The baking of resin impregnated armatures by the black emitter has reduced the time of this process from 12 hours to 47 minutes for an armature weighing 26 lb., while the uniformity of results is perfect, and certainly superior to batch convection stoving.

The use of infra red for removing moisture from food products such as macaroni has shown a possible use for the "black emitter," while the drying of papier mache loudspeaker cones by this process has reduced the time from 45 minutes to 2 minutes with greater esae of control and better uniformity of product.

These are but a few of the processes investigated by the G.L.C. industrial gas centre during the past six months; many such inquiries have opened up new fields for future development, notably for clay drying in the pottery industry, and the application of infra red to heat transformable inks in the printing trade for paper, metal and fabrics. The work has indicated that there is a very wide field for development, and that gas for infra red is firmly established.

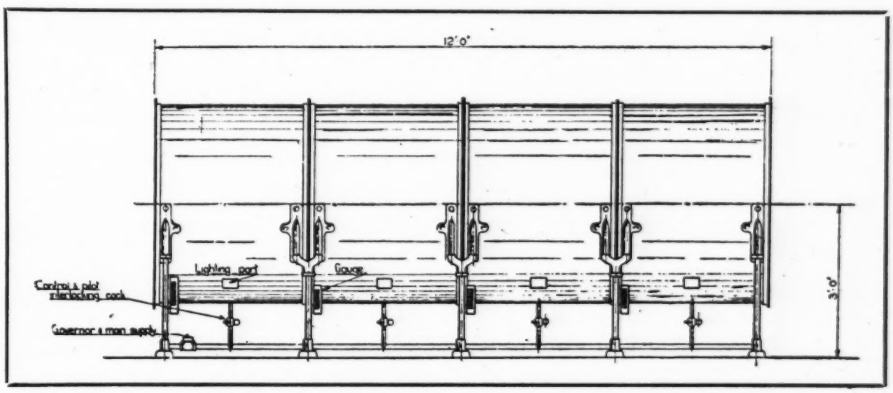
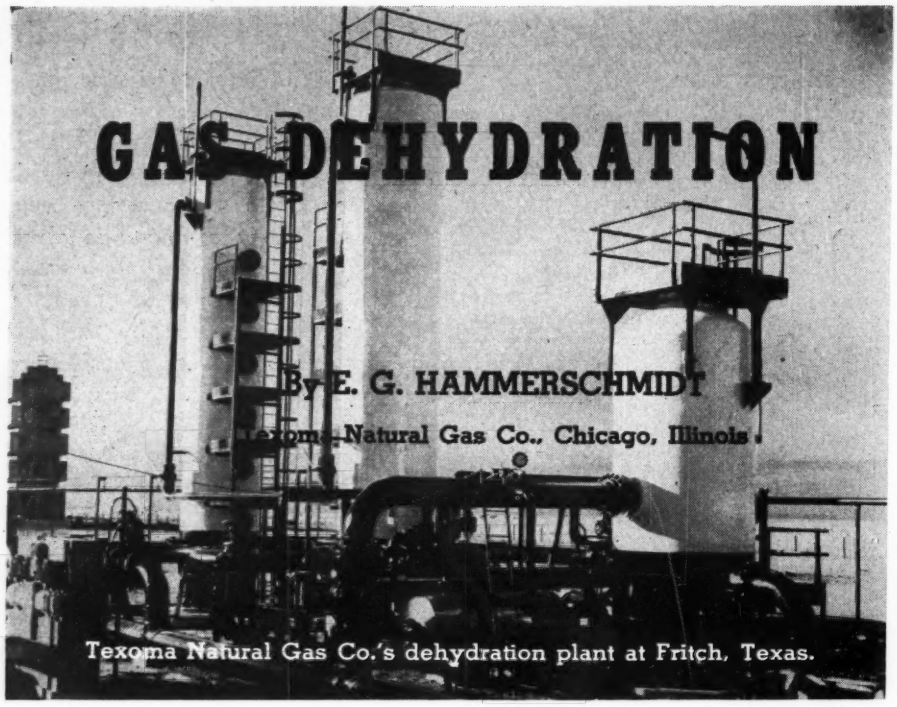


FIG. 5. Diagram of a 4-unit "black emitter" tunnel, side elevation.

GAS DEHYDRATION

By E. G. HAMMERSCHMIDT
Texoma Natural Gas Co., Chicago, Illinois



Texoma Natural Gas Co.'s dehydration plant at Fritch, Texas.

IN the latter part of 1940, Texoma Natural Gas Co. erected a plant at Fritch, Texas for the complete dehydration of natural gas by means of a granular desiccant. This is a brief case history of this particular installation.

The plant was designed and constructed by the J. F. Pritchard & Co. for the purpose of drying 80 million cu. ft. of gas per day at an operating pressure of 740 psi. Both of the drying towers are 5.5 ft. in diameter and contain about 400 cu. ft. or 20,000 lbs. each of granular desiccant. The desiccant fills the towers to a depth of 18.5 ft. Moist gas enters the top of the tower, and the dehydrated gas leaves the bottom of the tower 13 seconds later.

The adsorbent is reactivated by passing hot gas through the bed in reverse flow to the drying cycle. The reactivating gas is preheated to about 365° F with process steam in a conventional heat exchanger. The regeneration cycle requires 4 to 4½ hours, and the drying cycle requires from 7 to 11 hours, depending upon the moisture in the inlet gas. The dehydration plant is located on the downstream side of the gasoline plant oil absorbers. Additional details of the construction and operation of this type dehydration plant have been described in recent literature reports. (1), (2).

Soon after the plant was placed in operation, it became evident that greater pressure losses occurred across the adsorbent bed than had been anticipated from previously published data which were taken at atmospheric pressures. A study was therefore made to determine the effect of total operating pressure upon pressure losses. Details of this study are to be published later this year by Deschner, Hammerschmidt and Capell. In general, it was found that pressure losses vary directly with the density of the gas, the velocity of the gas remaining constant. For example, the normal velocity of the gas through the commercial unit is at the rate of 44 ft. per minute through the empty tower. Assuming that the velocity remains constant, the total pressure loss across the adsorbent bed would vary with the total pressure as follows:

Total Operating Pressure, psi.	*Pressure Loss, psi.*
700	8.85
600	7.48
400	5.15
200	2.40

Pressure losses can be reduced by using a larger mesh desiccant only at the expense of reducing the moisture capacity of the desiccant. The pressure loss through 2-4 mesh Florite is roughly one third less than the loss through 4-8 mesh. The moisture adsorbent capacity of several grades of Florite are as follows:

4-8 mesh	8.1 wt. %
2-8 mesh	6.9 wt. %
2-6 mesh	6.7 wt. %

When the Fritch plant was first placed in operation in December, 1940, each dehyration unit would remove about 2690 lbs. water per regeneration. Both units were charged with a pure grade of activated aluminum oxide (alumina) which adsorbed 13 wt. % water when new. However, there was a rapid decline in the adsorbent capacity of the alumina, and it had to be discarded after 36 weeks of operation, at which time, it was removing only 500 lbs. water per regeneration.

Samples were removed from each of the five trays in the adsorber at three different intervals for the purpose of measuring the efficiency of the alumina throughout the adsorbent bed. The adsorbent capacity of each sample is compared with new alumina in Table 1.

The cause of this rapid decline was at first attributed to the carry over of mineral seal oil from the gasoline plant absorbers. A typical anaylsis would show about 1.5% oil in the top tray, 0.1% in the second tray and none in the remainder of the bed. A large variety of hot and cold solvent washes were tested on small lots of the spent alumina, for the purpose of removing oil or other fouling agent. Reactivation was also attempted with high temperature air, ranging from 350° F to 800° F, with superheated steam, and by heating in a high vacuum. None of these treatments had any important effect on the restoration of the spent alumina.

A sample of new alumina was soaked in mineral seal oil. It was then reactivated at 360° F. This procedure was repeated for six cycles of soaking and reactivation, and at the finish, the reactivated alumina was still

MR. HAMMERSCHMIDT became chief chemist of Texoma Natural Gas Company in 1931 and has served in that capacity ever since.

During that period he has been very largely concerned with investigations into the prevention and elimination of gas hydrate formations, so much so in fact, that in 1939 he was awarded the Beal Medal by the American Gas Association for his paper, "Preventing and Removing Gas Hydrate Formations in Natural Gas Pipe Lines." A chemical engineering graduate from Iowa State University in 1923, Mr. Hammerschmidt acquired his early experience with Cities Service, serving until 1926 as plant chemist and assistant superintendent of natural gasoline plants at Caney and Madison, Kans. Following that time and until his appointment with Texoma, he was engaged in chemical research in natural gas and gasoline for Cities Service. The paper herewith published was presented before the Annual meeting of the Natural Gas Department of the American Gas Association in French Lick, Ind., May, 1944

adsorbing 62% of its original capacity. The results of these tests led to the conclusion that absorption oil was only a minor factor in the cause of the decline in adsorptive capacity.

A small pilot plant was next erected for the purpose of studying the rate of decline of several commercial adsorbents. Included in this study, were alumina such as originally charged to the commercial unit; Florite, an activated bauxite ore containing a considerable quantity of an iron compound; silica gel; and solid calcium chloride using spent alumina or pumice stone as a carrier or supporting agent. The capacity of the solid calcium chloride desiccant is quite high at the beginning, but it tends to dissolve and run down the column causing partial stoppage of the gas flow as well as loss in capacity as it is gradually removed from the surface of the carrier.

This condition can be remedied by periodically washing down the column with an aqueous solution of calcium chloride and then regenerating. From an operating standpoint, however, this practice is not as satisfactory as the use of a solid type adsorbent. In addition to the pilot plant tests, small samples of the various desiccants were placed in the top of a commercial unit for observation.

The results of these tests indicated that Florite might have the longest service life, and consequently one of the commercial units was charged with 20,000 lbs. of Florite desiccant on June 8, 1941. The initial capacity of the Florite was 1600 lbs. water removal per regeneration. At the end of the seventh week, it had declined to 1300 lbs. per regenration and then remained fairly constant at this point for a long period of time. Samples were removed from the top tray at several intervals, and a complete set of samples was removed from each tray at the end of 2.4 years continuous operation. The adsorbent capacity of each sample is compared with new Florite in Table 2.

At the end of 2.4 years (125 weeks) the Florite in tray No. 1 was replaced with new material. The remaining trays still contain the original charge and the overall plant efficiency as of April 23, 1944, is 66.7%, representing a service of 2.9 years (150 weeks).

The original charge of 20,000 lbs. alumina dehydrated a total of 6.6 billion cu. ft. of natural gas. The same amount of Florite had dehydrated 35.5 billion cu. ft. up to April 1, 1944.

The dehydration unit at the Texoma station in Moore County, Texas was completed in April, 1942, and it is also charged with Florite desiccant. The initial capacity of the Florite at this station was 2100 lbs. per regeneration. This is considerably higher than the initial capacity of the Florite at the Fritch station. At the end of the eighth week, the Moore County plant cycle had declined to 1600 lbs. per regeneration, and it then remained fairly constant until the 37th week, at which point another gradual decline started. At the end of the first year, this plant was removing the same quantity of water that the Fritch plant had removed at the end of one year of operation, and it has continued to coincide with the Fritch plant operations to the present date which completes a two year service record at the Moore County plant.

The results of the investigation of this problem have shown quite conclusively that solid desiccants such as alumina, Florite, and silica gel are adversely effected because of repeated reactivations and that the major part of the decline in adsorption capacity in the commercial units has been caused by the combined effect of moisture and heat.

Final proof of this statement has been obtained in an experiment that has been completed within the past month. (May, 1944). Samples of new and freshly reactivated alumina and Florite (separated by a plug of glass wool) were placed in a 1 in. diameter steel nipple in one atmosphere of pure air. The nipple was then tightly plugged. Similar samples were prepared in a second nipple after allowing the desiccants to adsorb water vapor in an amount equivalent to the normal adsorption cycle in the commercial plant. Both sealed nipples were then placed inside one of the commercial dehydration units where they were subject to normal heating and cooling cycles during the 7 2/3 months period from Sept. 5, 1943, to April 25, 1944. The adsorptive capacity of these samples together with retained samples of the new desiccants was then measured in a static test apparatus in which all six samples were tested at the same time in order to insure identical conditions of saturation. The results which appear in Table 3 show that little deterioration occurs from action of heat alone, but in the presence of both water vapor and heat, dehydration efficiency is greatly diminished.

TABLE 1. COMPARISON OF ADSORBENT CAPACITY OF EACH SAMPLE WITH NEW ALUMINA

	Efficiency, %		
Weeks of operation	7	16	19
Tray No. 1 (Inlet gas—top tray)	44.5	10.6	6.9
Tray No. 2	54.7	18.4	9.0
Tray No. 3	64.4	36.6	13.3
Tray No. 4	74.4	57.9	30.5
Tray No. 5	100.0	74.3	44.8
Overall Plant Efficiency	55.	39.	27.

TABLE 2. COMPARISON OF ADSORBENT CAPACITY OF EACH SAMPLE WITH NEW FLORITE

	Efficency, %			
Weeks of Operation	7	14	117	125
Tray No. 1 (Inlet gas-top tray)	66.8	52.5	37.4	33.4
Tray No. 2				77.4
Tray No. 3				69.7
Tray No. 4				70.6
Tray No. 5				69.5
Overall Plant Efficiency	81.	79.	71.	70.

TABLE 3. RESULTS OF SAMPLE TESTS

	Wt. % Water Adsorbed	*Efficiency %*
New Florite	7.0	100
Florite, dry, after 7 2/3 Mo.	6.6	95
Florite plus water vapor, after 7 2/3 Mo.	4.5	64
New alumina	11.4	100
Alumina, dry, after 7 2/3 Mo.	10.6	93
Alumina plus water vapor, after 7 2/3 Mo.	0.2	2

REFERENCES

(1) Capell, R. G. & Amero, R. C., Oil and Gas Journal, 6-18-42, p. 37.
(2) King, H. L., Laughlin, C. D. and Gwyn, H. M., Oil and Gas Journal, 4-29-44, p. 71.

This paper was prepared for presentation before the AGA. spring conference on May 13, 1944, at French Lick, Ind.

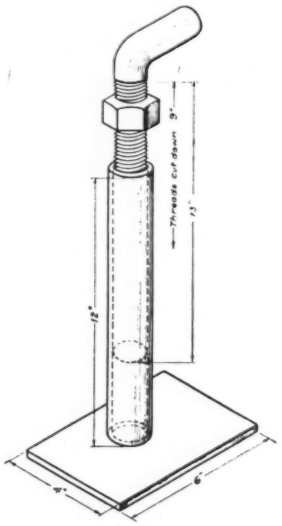
OPERATING IDEAS

Safety Block for Use On Ingersoll-Rand Engines

WILBUR THORPE, auxiliary engineer, Hansford Compressor Station, Panhandle Eastern Pipe Line Co., Kansas City.

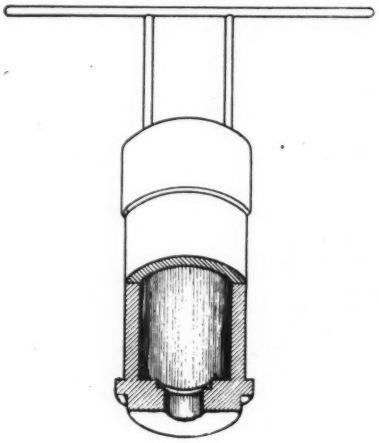
The purpose of the safety block is to hold an Ingersoll-Rand engine at any spot during the course of overhaul. When part of the pistons are removed, there is quite a tendency for the engine to turn or flip over. This is not only dangerous, but it causes difficulty in holding at certain positions while the remainder of the job is done.

Two tools are necessary for the intended job. They are made by welding a 1¼ in. nipple, 12 in. long, on top of a 4 in. x 6 in. steel plate. On the inside of the 1¼ in. nipple is inserted a 1¼ in. rod or bolt, 13 in. long, with a nut on it. The threads run down for 9 in. A hook 4 in. long is welded on top of the rod or bolt. These hooks are put in the holes in the flywheel on each side of the engine, and rest on the engine base. The hooks can be run up or down to match the holes in the flywheel by running the nut on the rod up or down.



SAFETY BLOCK.

GAS will pay $5 for useful ideas published on this page. Descriptions should be brief and accompanied by a reproducable drawing or photograph. Send ideas to G A S, 1709 W. 8th street, Los Angeles 14, Calif.



SPARK PLUG WELL SEAT GRINDER.

Grinder Made of Scraps

CHARLES HELLEN, auxiliary engineer, Olpe Compressor Station, Panhandle Eastern Pipe Line Co., Kansas City.

The spark plug well seat grinder is a handy gadget that can be made of scraps. It is helpful in cleaning and grinding well seats on Worthington 1300-hp cylinders, especially after they have been repaired. The device as drawn will clear all stud bolts, and will even the coil. Therefore, there is no need to remove the studs, and no knuckles are skinned. The tool also saves quite a bit of time.

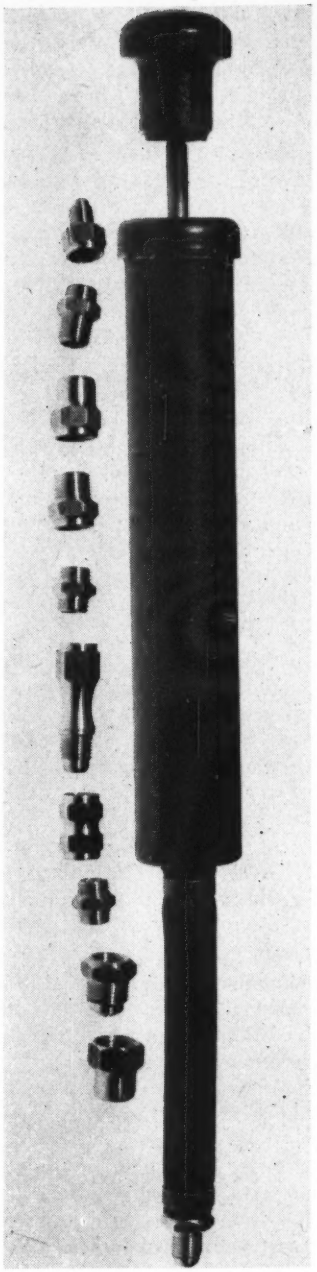
Gas Pilot Blast Pump

W. A. COHICK, service man and service inspector, East Bay Division and J. E. AYMAR (deceased), of Pacific Gas and Electric Co., San Francisco. **This device won the second prize of $150.00 in the 1943 Annual Awards of the company's Employee Suggestion Plan.**

This device is designed to clear stoppages in gas appliance pilot lines with a minimum of expense and trouble.

It consists of a small piston type air pump to which are attached a number of male and female fittings designed to fit the great majority of standard pilot line and valve fittings.

In use the proper size fitting is selected and attached to pilot line to be cleared. A few quick strokes of the pump is usually sufficient to clear the most obstinate stoppages. Pilot regulating valves may be quickly cleared in the same manner.



Nearly all service calls of this kind can be satisfactorily completed in just a few minutes. It is no longer necessary to dismantle part of an appliance in order to get to, or remove, a pilot for cleaning. Pilot valves, being small, have a discouraging habit of breaking off when being removed for cleaning—occasionally necessitating a trip to the shop for a new valve. This device reduces the necessity of removing these valves to a minimum.

Approximately 300 of these blast pumps are in use throughout the Pacific Gas and Electric Co. system. They have more than proved their worth under present conditions by their conservation of time and manpower.

CORROSION AND PROTECTION

Of Buried Metallic Structures

Compiled and Abstracted by GUY CORFIELD, Technical Editor, GAS

5. Cathodic Protection, Influence on Adjacent Structures

Cathodic Protection Interference

A. V. SMITH, consulting engineer, Philadelphia, Pa. Excerpts from a paper, "Cathodic Protection Interference," presented before the American Gas Association's 20th Annual Distribution Conference in Cincinnati, Ohio.

THE purpose of this paper is to bring under one heading the most important of the many factors governing the relation of cathodic protection on one structure to another unprotected structure. It gives a simple explanation of the effect of anodes, with diagrams explaining the effects wherever such diagrams are possible, and some actual data for tests made to show the effects of cathodic interference and how such problems should be handled.

Anode Effects

In considering two parallel pipe lines and their current flow in structures with the anode close to the structures, the currents would be represented by the curves in Fig. 1. In Fig. 2 are shown the same conditions with the anode moved out a great distance. It will be noted that the current flow line for the foreign structures has been completely turned over. At some point between the point of Fig. 2 and the pipe line the anode could be placed so that the curve for the current flow on the foreign pipe line would be reduced to zero as shown by the dotted line. This will occur when the foreign pipe line becomes a conjugate part of the cathodic protection circuit. However, it is not practical in most cases to obtain a point where less than 5% of the anode current is in the foreign pipe line.

There are two methods that can be used to eliminate the effect of the anode when it has been placed at a point to give the minimum effect. One would be the installation of an electrical bond between the two structures so as to remove all the picked up current from the pipe line, and the other method would be to install a sufficient number of insulating joints at proper locations in the foreign structure to eliminate the flow of current on the pipe line.

The use of insulating joints in a steep gradient may be hazardous and, therefore, better engineering results would be obtained by using insulating joints only in conjunction with the movement of the anode away from the pipe lines to the balance point.

When the anode has been placed so that the foreign structure becomes a conjugate part of the cathodic protection ground network it will be found, as previously stated, that the foreign structure will carry a small amount of current. This current is, therefore, termed the "residual current" because it is the interference current remaining in the structure after the anode has been placed at the best possible balance point.

Inasmuch as it will not be practical in all cases to place the anode at a point where the residual current or interference current is less than 5% of the anode current, the anode should therefore be placed on the far side of the balance point so that the minimum interference current on the pipe line will flow from the extremities of the foreign structure toward the protected pipe line cathodic attachment. Under these conditions the interference current may be removed by an electrical bond between the two structures.

The interference current which must be removed from the foreign structure may be determined in the following manner:

Referring to Fig 1, terminals are selected at various intervals along the foreign structure for the measurement of the ground voltage and the measurement of the current flow in the pipe line. Referring to the curve for the theoretical flow on the pipe line as shown in Fig. 1 the current at terminals CD and IJ would be a maximum and the current at terminals EF and GH are a minimum. In other words, the difference between terminals CD and terminals EF represent the gain or loss of current between the points CD and EF and likewise the difference in currents at terminals IJ and GH represents the gain or loss from the opposite side of the anode position. Therefore, the sum of the currents at terminals CD and IJ

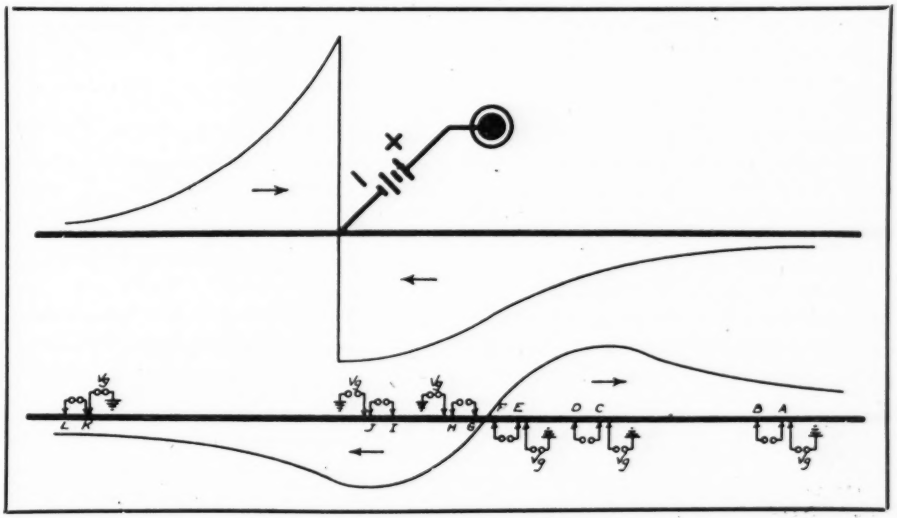


FIG. 1. Current flow on two parallel pipe lines—anode close to structure.

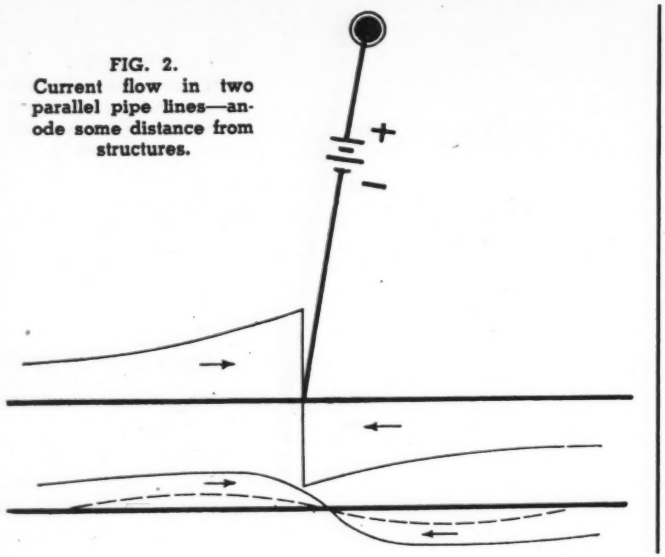


FIG. 2.
Current flow in two parallel pipe lines—anode some distance from structures.

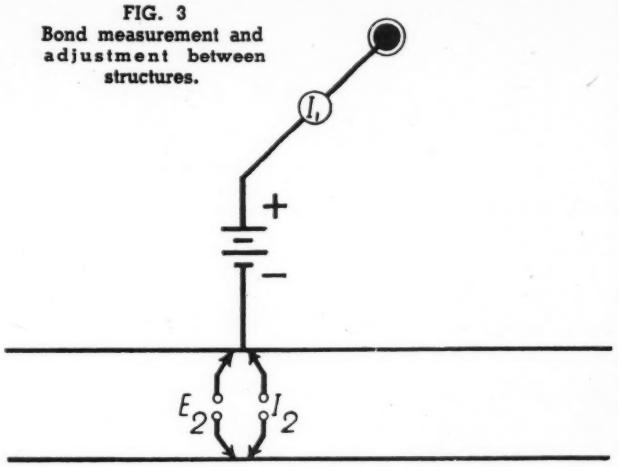


FIG. 3
Bond measurement and adjustment between structures.

would be the total interference current if these terminals had been properly selected so as to show the maximum current.

If the terminals CD and IJ are selected so that when increments of anode currents are used there is no ground voltage change observed at the Vg terminals the point where there is no interchange of current between the pipe and earth has been reached and is often referred to as the point of zero potential. At this point of zero potential the maximum interference current will be found in the pipe line.

Determining Resistance of Bond

Again referring to Fig. 1 and the above description an electrical bond installed between the cathodically protected pipe and the foreign structures must produce a flow of current equal to, or greater than, the loss of interference current as measured between terminals CD and EF (the terminals at the zero potential point). Major terminals are therefore selected (Fig. 3) as between the two structures and increments of current are produced in these terminals with a test battery. The effect of the increments of current at the terminals along the foreign structure are measured and these data tell how much current will have to be delivered between the two structures to eliminate the loss of interference current. Likewise, the effects of these increments of current are also determined for the cathodically protected line.

If the internal resistance between the two structures is known then sufficient data are at hand to design the electrical bond which will remove the interference current. For simplicity in the description of the design of this bond, let us assume that there are no extraneous potentials between the two pipe lines.

Referring to Fig. 3, the internal resistance between the two pipe lines should be measured by using current from a test battery in terminals I_2 and reading the corresponding voltage drop at terminals E_2. (Note that there are two independently connected circuits to avoid errors which will be produced by IR drops in commonly connected leads). The internal resistance is then:—

$$\frac{\triangle E_2}{\triangle I_2} = R_{2,2}$$

With the voltmeter still connected as E_2 the anode current is then operated and I_1 recorded. These produce:—

$$\frac{\triangle E_2}{\triangle I_1} = R_{2,1} = \text{Coupling resistance}$$

Once the amount of anode current has been decided on, then $R_{2,1}$ times that value gives the voltage difference it will produce between the two lines $=E_2$. With this voltage a bond between the two structures must therefore deliver at least the current sum of terminals CD and IJ of Fig. 1. The value of the resistance of this bond is determined from the following equation for current flow:

$$I_2 = \frac{-E_2 + E_G}{R_{2,2} + B_2}$$

Solving for B_2

$$B_2 = \frac{(-E_2 + E_G)}{I_2} - R_{2,2}$$

There I_2 is the bond current

E_2 is the open circuit potential produced by the rectifier $= I_1 R_{2,1}$.

E_G is the galvanic potential between the structures.

$R_{2,2}$ is the internal resistance between structures.

The installation of a bond wire between the two structures having a resistance (total—including contact resistances) equal to or less than B_2 will eliminate the effect of the cathodic interference current on the foreign structure. From the above equation it will be seen that if the galvanic potential between structures (EG) is zero, the I_2 is approximately equal to the sum of the currents measured at terminals CD and IJ of Fig. 1.

If there were extraneous potentials existing between the two pipe lines, or a pipe line and a lead sheath cable, the installation of the bond would cause galvanic currents to be superposed on the interference current. This superposed galvanic current would effect both the protected structure and the foreign structure, the effect depending on the polarity of the galvanic potentials. Also the installation of the bond would change the rectifier requirements for the protected structure. All of these factors may be accounted for by the proper application of the network constants. As a matter of record the formula which will take into account all the factors is recorded here for reference as follows:—

$$R_B = \frac{(E_B + I_1 R_{B,1})}{\frac{R_{2,1}}{I_1 \times R_{2,3}}} - R_{B,B}$$

Where:

$R_{B,B}$ = Internal resistance between structures.

$R_{B,1}$ = Coupling resistance between structures from anode current.

$R_{2,1}$ = Vg coupling for worst exposure on foreign structure.

$R_{2,B}$ = Coupling from bond current at same Vg.

$R_{3,B}$ = Vg coupling for worst exposure on protected structure.

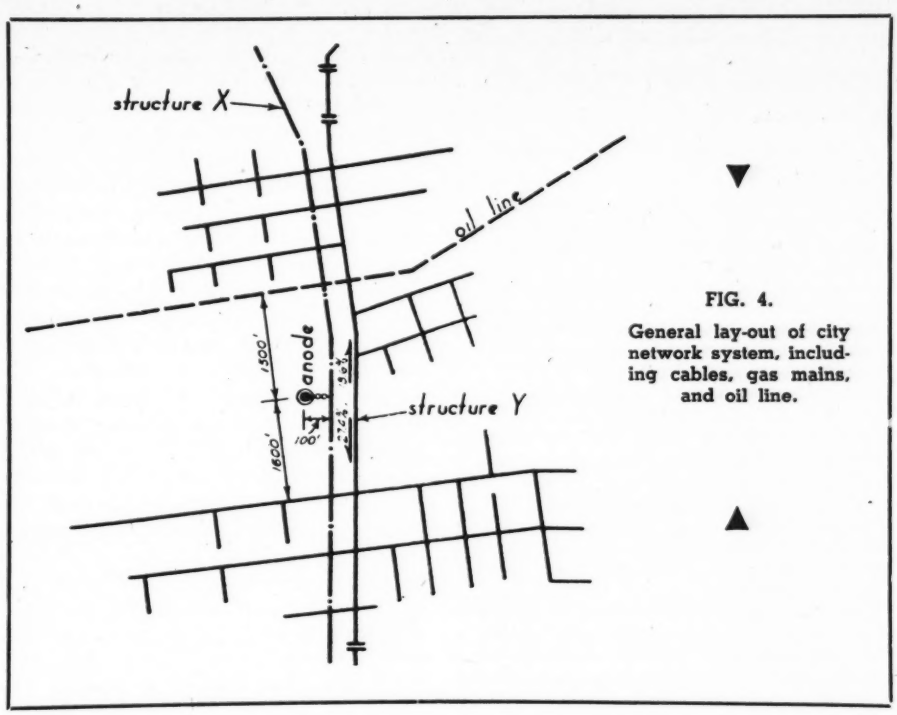


FIG. 4.

General lay-out of city network system, including cables, gas mains, and oil line.

$R_{3,1}$ = Coupling for anode coupling at same Vg.

I_1 = Total anode current, including increase due to Bond Current I_B.

$$I_1 = I_o \times \frac{R_{2,B} \times R_{3,1}}{(R_{3,1} \times R_{2,B}) - (R_{2,1} \times R_{3,B})}$$

$$I_B = \text{Bond Current} = I_o \times \frac{R_{2,1} \times R_{3,1}}{R_{3,1} \times R_{2,B} - (R_{2,1} \times R_{3,B})}$$

I_o = Anode current needed for protection, foreign structure NOT bonded.

Complications of City Networks

To show the complications of cathodic interference in city networks the following case is presented. Fig. 4 shows the general layout of a cable system (Structure X), which needed cathodic protection, a network of gas mains and an oil line. The engineers for the cable system installed a rectifier as shown in Fig. 4 with the anode 100 ft. from the cable system in a vacant lot.

Under this condition the interference currents observed in the gas main system (Structure V) is shown by the arrows with figures which show the percentage of interference current and its direction of flow. It will be noted that the interference current amounted to 46% of the anode current.

The engineers for the cable company then suggested, upon our complaint, that the anode be moved further away from the cable system in an attempt to make the gas main system become a conjugate part of the cathodic protection circuit. As the anode was moved away from the cable system the oil line, as represented by the dotted line, and the gas main system on the opposite side of the anode running at right angles to the cable system then began to carry appreciable interference current. If the anode was moved far enough to make the gas mains, which parallel the cable system, a conjugate part of the cathodic protection network, the gas mains and structure running at right angles to the parallel then carried an appreciable amount of interference current. Also with the anode placed a considerable distance away, the foreign network starts to shield the cable system making protection for the cable more difficult.

This demonstrates the enormous amount of interference current which will be found on foreign structures in the city networks almost regardless of the location of the anode if it is remote from the structure. By a remote anode is meant one which is more than several pipe diameters away from the structure to be protected.

The only place where an anode can be used in a city network with unappreciable interference currents is where the anode is a parallel anode laid so close to the structure to be protected that its field will not spread to the other structures in the street. Due to this required proximity little protection will be obtained beyond the linear length of the parallel anode. In other words, the parallel anode must be installed throughout the extent of the area to be protected.

Where two structures are located within a reasonable distance of each other and cathodic protection is installed on one structure, cathodic interference will undoubtedly exist to some extent on the other structure. If properly handled this interference current will in no way endanger the foreign structure. Also this interference can be used to provide some protection for the other structure. The only way to obtain these desirable results is through the cooperation of both or all of the involved structures.

Cathodic Protection Co-ordination

G. R. OLSEN, corrosion engineer, United Gas Pipe Line Co., Shreveport, La. From a paper, "Cathodic Protection Co-ordination" as published in the "Petroleum Industry Electrial News" and presented before the Annual Meeting of the Cathodic Protection Section of the Petroleum Industry Electrical Association.

DURING the past few years the development of cathodic protection has been progressing at a very rapid rate. With the successful application on a large scale to bare and poorly coated pipe lines, it appears that the future will be limited only by the ability of owners of underground structures to cooperate in the economic solution of their joint corrosion problems.

Due to the large number of underground structures now installed, cathodic protection coordination has become extremely important. One or more crossings or parallels with foreign-owned lines are invariably encountered in the installation of electrical protection even on cross-country transmission lines. Such problems, of course, become very much more involved near towns, cities, and oil or gas fields. In most cases of comparatively close proximity, it is difficult, if not impossible, to satisfactorily protect one underground structure without supplying at least partial protection to other structures in the near vicinity.

In many instances in the past the total cost of corrosion control has been greatly increased because each owner has applied cathodic protection individually to his underground structures or because one owner has failed to appreciate the value of cathodic protection. In at least a few cases, certain owners have obviously taken the stand of attempting to obtain free protection to their structures by refusing to participate in joint installations. Fortunately, this stage in the

TABLE 1. GENERAL RULES FOR HANDLING JOINT CATHODIC PROTECTION INSTALLATIONS

1. Any owner considering the installation of cathodic protection in a given area shall immediately notify all other owners of underground metallic structures in that particular area.

2. Each company in the area concerned who approves the general rules for handling joint cathodic protection installations shall place all corrosion data, which it has available for that particular area, at the disposal of all other companies.

3. The engineers in charge of cathodic protection for each company shall determine the amount and distribution of cathodic protection which is considered necessary for the protection of his own structures in that particular area. This information shall be made available to the engineers of all other interested organizations.

4. The engineers of the companies concerned shall each prepare preliminary estimates and make studies to determine the economic value and approximate cost to their company of a complete installation to provide the protection required by all the companies involved.

5. After these preliminary estimates have been prepared and submitted to the proper authorities, appointed representatives from each of the interested companies shall meet and decide whether or not the project is feasible. These representatives shall determine which company shall construct, operate, and maintain the proposed installation. In general, the installation shall be made by that company who, due to predominance of underground structures to be protected and/or local facilities or conditions, is best able to install, operate, and maintain the installation at the lowest cost. The company thus selected will be designated as company "A" in the following:

6. Company "A" will be responsible for carrying out the final estimate, design, and installation. The estimates and designs shall be approved in advance of construction by all interested companies, and company "A" shall notify all affected companies prior to the installation so they may have representatives present during construction. Each individual company shall install and maintain the necessary drainage connections between their lines and the cathodic protection units.

7. Upon completion of the installation, joint tests, alterations, adjustments, and approval shall be made by representatives of all the interested companies to their mutual satisfaction. Company "A" shall not be obligated to provide full cathodic protection, but will be required to maintain the drainage as agreed upon above as continuously as possible under practical conditions.

8. Company "A" will bill each of the other interested companies annually a percentage of the total cost of the project, including fixed charges, operation, and maintenance costs. An equitable distribution of costs between the interested parties shall be mutually agreed upon after final field adjustments have been made. Except in cases where special conditions exist, it is recommended that these costs be divided in proportion to the amount of direct current drained from each company's underground structures.

9. It is intended that all affected underground structures, regardless of ownership shall be electrically protected as though they were owned and operated by one company.

development is rapidly becoming past history and more and more owners are each year coming to appreciate the value of cathodic protection and realize the importance of cooperation.

It has been noted that each year a number of companies have adopted cathodic protection in their corrosion control programs and made their first practical installation. In some cases these companies, new in the cathodic protection field, have altogether disregarded foreign structures in the vicinity of their lines. This is usually due to lack of knowledge regarding the problems involved.

Cooperative Action Needed

It is believed that corrosion engineers can make a real contribution by contacting those companies whenever possible before they make their first installation and explaining the mutual need for cooperative action. This will help them avoid the mistakes some of us have made in the past and eliminate the necessity of correcting difficult situations after installations are placed in service.

It is believed that the corrosion problem in any given area should be attacked and solved with a viewpoint similar to that which would be used if all underground structures were operated by one management. If this could always be done, the problems encountered in the successful application of cathodic protection would be greatly minimized and unit costs materially reduced.

With these ideas in mind the writer in December, 1940, participated in the preparation of a first draft of "General Rules for Handling Joint Installations." A revision of these rules was made in April, 1942, and is reproduced in Table 1.

During the past few years, a number of joint agreements have been entered into which were essentially based on these General Rules for Handling Joint Installations. The results realized during two to three years experience have been entirely satisfactory to all parties concerned. In each case considered to date the costs have been divided in proportion to the direct current drained from each owner's line. However, it is realized that this method of dividing costs might not be entirely equitable in some special cases. The real value of cathodic protection is of course influenced by many factors, the most important of which, in considerations of this kind, is probably the time in years that it will be desirable or necessary to maintain the structure in service. In time, we will undoubtedly obtain sufficient practical experience to be able to set up detail rules covering all types of installations. However, for the present, it seems advisable to word the agreements or contracts in such a way as to permit the engineering representatives to use a maximum of personal judgment in arriving at a fair distribution of costs for each particular case. Although little trouble is usually encountered in arriving at a mutually satisfactory division of annual costs, it may be advisable to make provisions so that special cases may be submitted to arbitration committees.

Contracts Suggested

In connection with our new installations, it is being found that the number of crossings and parallels requiring joint agreements are multiplying rapidly and the time required to handle all the details is becoming an appreciable burden. No doubt other organizations are, or soon will be, having the same trouble. For this reason, it is suggested that consideration be given to drawing up general contracts which would cover all co-operative problems between any two companies. The details of each specific problem can then be handled directly by representatives of each company, confirmed by exchange of informal memorandums and the accounting departments instructed to handle the necessary billing under the general contract. In this manner, after having entered into general agreements with all of the companies operating in a territory, it would be possible to handle each co-operative problem more or less in a routine manner.

The general contracts in mind would be similar to those which have been used by telephone and electric power companies for years to cover joint use of pole lines. They would incorporate the principles outlined in the General Rules for Handling Joint Installations, but leave as many of the details as possible to be worked out jointly for each specific problem by the engineering and operating personnel.

METAL DISC BURNER

Survey of California Utility Women Prompts Development of Suggested "Ideal" Gas Range Top Section by Pacific Coast Laboratories.

IN March, 1943, the Women's Committee of the Pacific Coast Gas Association asked the women employees of member gas companies, except those directly engaged in sales and home service work, to describe the ideal gas range that they would like to possess, from the standpoints of appearance, performance, convenience, shape, arrangement of parts.

No outline or check sheet was provided, and therefore the answers were spontaneous, widely varied as to character and specific subject matter, and in no way guided or influenced. When the results became available to Pacific Coast gas companies, the Gas Appliance Laboratory of the Southern California Gas Company and the Southern Counties Gas Company of California, analyzed and summarized them in terms of the several range sections.

The major items of the top section comments and suggestions presented in the accompanying table.

Having studied the summary as shown in the table, the Gas Appliance Laboratory set out to see what could be done to approach this ideal, and recently exhibited the results, in the form of mock-ups and semi-working models, to manufacturer's representatives. Purpose of this activity was to stimulate interest, attempt to show what might be accomplished. Anything presented was in the nature of a suggestion and not a recommendation.

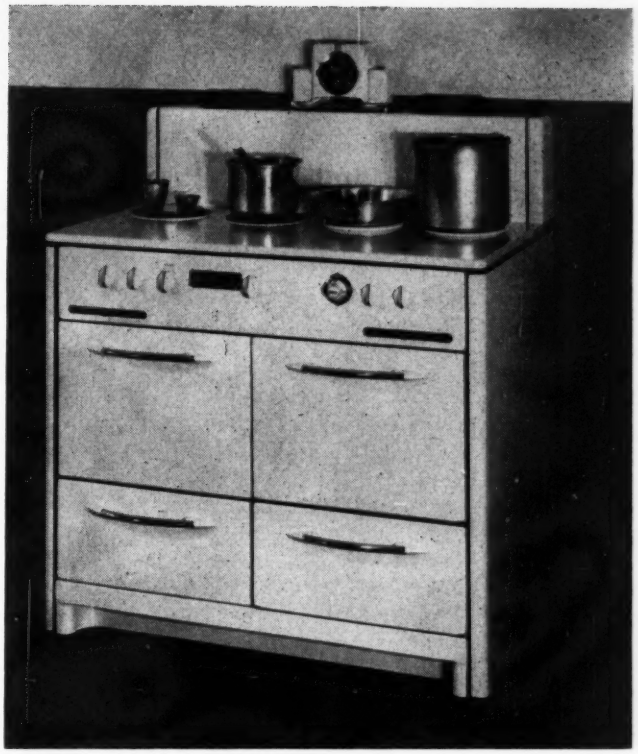


FIG. 1.

Arrangement of top section on a mocked-up top surface superimposed on a contemporary range.

The arrangement and general appearance of the top section is shown in Fig. 1, wherein a mock-up top surface has been applied to a contemporary range. The essential feature is the burner-grate assembly, which is actually a burner integral with and superimposed by a metal disc, which disc directly supports and imparts heat to the cooking vessel. This design lends itself to development of vertical venturi tubes, so that the disc, burner and mixing tube can be lifted bodily upward in one piece and cleaned and replace with relative ease. This arrangement satisfies the "Easy to Clean" requirements.

To comply with the "Satisfactory Appearance" item, the top is smooth and white with the exception of the discs, which are black. If this contrast is not thought desirable, it would seem probable that postwar technology will provide a white material or coating that will withstand the necessary heat. In the mock-up (Fig. 1) the two left-hand discs are black and the two right-hand ones, white.

Fig. 1 also shows that the requirements of "Arrangement of Burner Grates" have been met, in that there is plenty of room and adequate support for cooking vessels of all sizes with handles out of heat zones; also there is considerable working space.

The "Heat Distribution" characteristics are excellent, from the smallest simmer flame to full burner output, as the metal disc "smoothes out" the heat and enables even and uniform cooking at any temperature.

A requirement not mentioned by the contestants, that of thermal efficiency, is satisfactorily met by this disc grate assembly, when tested and compared with contemporary burners. Combustion is also satisfactory. All things considered, and while this development is admittedly at an early stage, it appears to have considerable possibility as an alternative to more conventional arrangements.

THE TOP SECTION OF THE POSTWAR GAS RANGE

Here is What Pacific Coast Gas Industry Women Want

Make It Easy to Clean

1. With flat, smooth surfaces free from cracks, ridges, name plates, seewheads, etc.
2. All edges and corners, where horizontal and vertical surfaces meet to be continuous and curved with relatively large radius bends.
3. Grates or actual cooking surfaces as smooth and flat as possible, with burners completely protected from boil-overs and splatters.
4. Grates and burners that can be easily removed for easy cleaning.

Satisfactory Appearance

1. Elimination of top covers.

Arrangement of Burner Gates or Actual Cooking Surfaces So That:

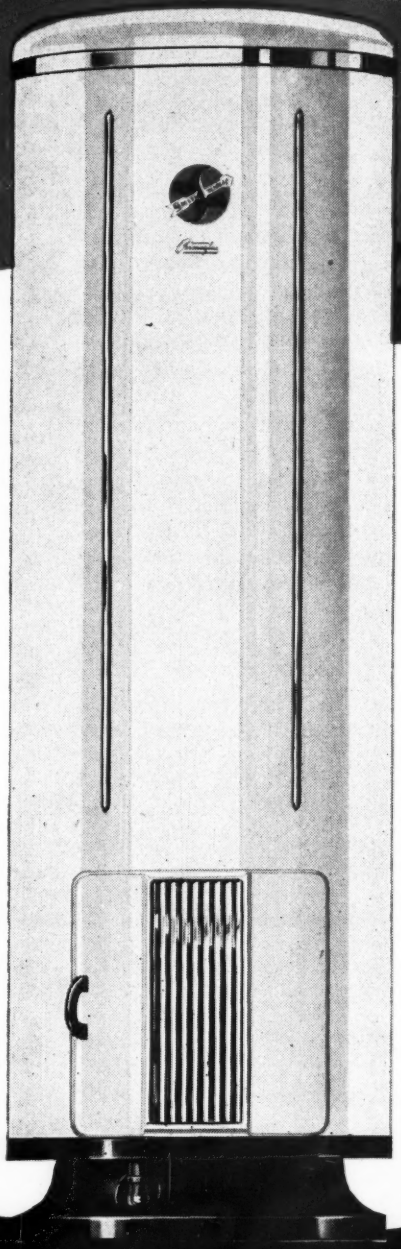
1. A large pan or skillet centered on one grate will not overlap another.
2. Pan handles can be placed so as not to be heated by adjacent burner.
3. Satisfactory support is provided for all sizes of vessels from small cups to large skillets.
4. Adequate working space is available in addition to actual burner space.

Even and Uniform Heat Distribution

1. Across top of grate.
2. Along bottom of vessel.
3. Regardless of size of flame.
4. Regardless of size of vessel.

23,000 TEST-YEARS *Prove*

THERE IS ONLY *ONE* PERMAGLAS



THE equivalent of 23,000 years of metallurgical and ceramics research was required to perfect SMITHway *Permaglas* for water heater tanks. Just "any glass lining" won't do! There is no way to by-pass the time, patience, scientific knowledge and facilities required to develop the ceramics formulae and the metallurgical processes that have made *Permaglas* possible.

Resistance to thousands of water specimens, and a multiplicity of other time-consuming tests starting way back in 1929, continued for eleven long years before we were ready to offer *Permaglas* to the public.

These are the "hidden values" of *Permaglas* . . . reasons why "there is only ONE *Permaglas,*" the sparkling blue, mirror-smooth, glass-fused-to-steel lining that makes *Permaglas* Gas Automatic Storage Water Heaters the easiest to sell, and the best anyone can buy.

Write for "The Inside Story of *Permaglas*". . . a great aid to sales.

"Heated with Gas, Stored in Glass"

A. O. Smith Corporation,
Dept. G145 H

Please send me a copy of "The Inside Story of *Permaglas.*"

Name.....

Title.....

Company Name.....

City and State.....

SMITHway *Permaglas*
GLASS LINED
TRADE MARK REG U.S. PAT OFF

POSTWAR NOTES and NOTIONS

By STANLEY JENKS

A Nomination

If there is one job of which the American gas industry can be justly proud, it is that which is being done by the A.G.A. Post-War Planning Committee. It is amazing the territory it has covered through its sub-committees, and the zeal with which it has tackled the task assigned it.

Every year, the A.G.A. presents the Monroe award to the member with an outstanding record of accomplishment on behalf of the industry. For my money, Alec M. Beebee, the indefatigable chairman of the A.G.A. Post-War Planning Committee, merits the award.

Who'll second the nomination?

Scientific Rates

One of the really significant documents we have available in formulating our post-war plans, curiously enough, is the 1938 A.G.A. Rate Committee Report, written by Donald A. Henry, chairman, and supplemented with an appendix "A Weighted Analysis of Domestic Gas Rate Levels" by R. E. Ginna, and another "'Purpose Type' Rates for Commercial-Industrial Load" by Allan W. Lundstrum.

The fundamentals of proper rate-making as laid down by the committee are just as basically true today as they were six years ago. The Post-War Planning committee has repeatedly emphasized the importance of market analysis and cost studies as a foundation for better load building rates. Back in 1938 Mr. Lundstrum wrote "Gas utilities are faced with competition increasing in its severity, and they are faced with the necessity of meeting this competition if they are to remain financially solvent so that they can continue to render the high quality of service which their customers have the right to expect. This competitive condition can only be met by facing fairly and squarely the fundamentals of the problem. Therefore, it is becoming increasingly important that utilities consider the adoption of rate structures which are fundamentally and mathematically sound, and which are flexible enough to meet changing conditions rapidly." Right!

Good News

It looks as though we'll soon have the funds to do the researching and promoting advocated by Ernie Acker and his special committee on Gas Industry Research and Promotion. You remember that this committee is asking the gas industry for $1,000,000 annually to supplement the $400,000 now being spent annually on national advertising.

As I write, and there are still several days left before the New Year, the amount subscribed is over $850,000. John West, who makes these figures official, tells me that substantial support is anticipated from our Canadian gas brethren. With some gas companies undoubtedly lagging rather than lapsing, it seems certain that by the time these lines are in print, the budget will be bagged, and the first hurdle to the consummation of the plan cleared. I would like to see it oversubscribed by half a million dollars. In fact, I hope every gas company in the United States and Canada will be in there pitching with a subscription, because an industry-wide investment in this plan is the surest way to insure that it will pay better than anticipated dividends to its subscribers.

If ever an industry needed such a plan intelligently administered and applied, it is ours *now*. The best executive brains in the industry have formulated it, and I am sure they can be trusted to make it click.

There are specific problems to be solved which can only be tackled on an industry-wide basis.

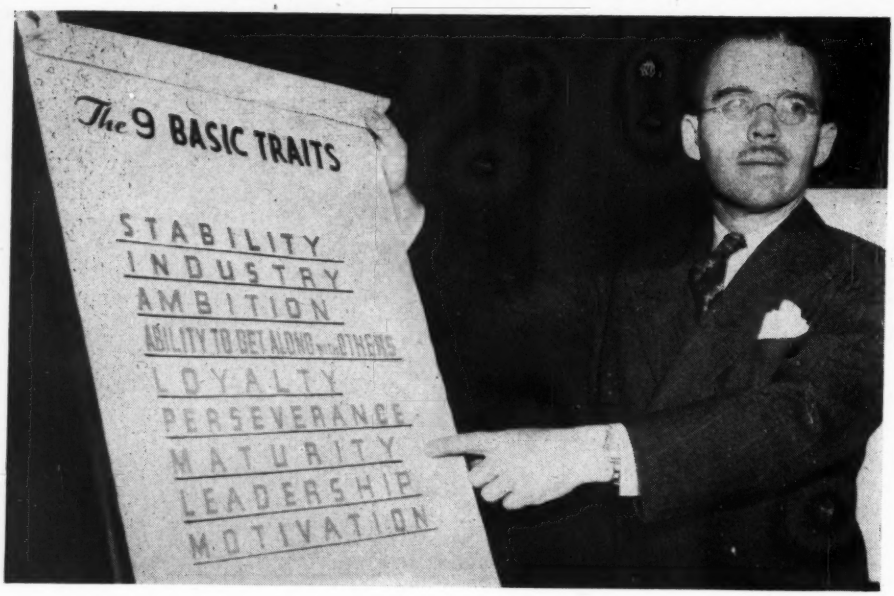
Publicity

It was the late "Bathhouse" Somebody-or-other, Chicago alderman, who once said, "I don't give a damn what the newspapers say about me, so long as they say something." He, as a public figure, appreciated the merits of publicity. Our film stars and others who thrive on public opinion must feel that a good press agent is worth his salt, or they wouldn't hire him as they do. By the same token, a public utility industry like ours needs a constant "press". We somehow don't seem to get it. Or is the lack of editorial interest in our doings a measure of the esteem in which we are held? F'rinstance, a few days ago, the very influential *Wall Street Journal* front-paged a story headed "Electric Appliance Firms To Employ 25% More After V-E Day Than in 1940." To the man in the street the inference is painfully obvious. America is going electric more than ever as soon as it can. This excellent publicity arises from a simple news item covering a recommendation to W.P.B. by the advisory committee of the electric appliance manufacturers. A similar condition is undoubtedly just as true of our own gas appliance manufacturers and probably more so. But, somehow or another, when we belatedly get into the news columns, it takes a sticky rate case, an argument over a new pipe line project, or a holder explosion to get us there. Maybe things will be different when the new promotional director at A.G.A. with his $200,000 annual appropriation starts swinging.

Lower Gas Costs

One of the objectives in the national promotional and research program is a method of producing gas cheaper. Which is just another way of conceding that the costs of manufacturing gas are too high.

Quite recently I was discussing with one of our nationally known production experts the British practice of residual production to reduce holder costs, in some instances, to practically nothing. This expert—I purposely am keeping him anonymous in case I completely misunderstood him—blandly stated that American utility regulatory practices discouraged residual production. In other words, if I understand him correctly, the savings effected come out of the pockets of the stockholders, and which in turn implies that the cost of added residual recovery equipment cannot be capitalized for rate-making purposes. It just doesn't make sense to me. Surely, every regulatory body welcomes any additional plant investment that reduces gas costs without impairing the permissible net earnings of the gas utility. Of course there have been instances where public regulatory bodies have definitely objected to the organization of wholly-owned subsidiaries to handle residual sales and thereby create a channel through which profits could be drawn off beyond the control of the rate-makers. But that, my friends, is a different colored quadruped.



In the introduction to the Servel Salesman Selection Program Dr. Robert N. McMurry, noted industrial personnel consultant, pointed out the nine basic traits that are desirable in a domestic gas appliance salesman.

A FOUR-PHASE PROGRAM FOR SELECTINC AND TRAINING

Gas Appliance Salesmen

THE Servel Salesman Selection Program which has been officially adopted as the first step in the American Gas Association's four-part plan for the selection and training of domestic gas appliance salesmen was presented last month to gas company executives during a series of seven regional meetings.

The seven meetings were held during November and December in Boston, New York, Pittsburgh, Chicago, Kansas City, Dallas, and Atlanta, and more than 750 top executives and sales managers were in attendance to receive first hand information on the program.

Judging from the high percentage of response a majority of American gas companies will undertake development of this plan in their local operations early in 1945.

As a follow up to this series of announcement meetings, Servel Inc., Evansville, Ind., originators of the salesman selection program, are arranging a series of three-day training clinics on the new program for the benefit of interested utilities. These clinics are designed primarily to train gas company personnel who later will be assigned to the work of selecting gas appliance salesmen for postwar jobs.

The prescribed course of training as outlined in a series of manuals prepared by Servel has five primary objectives. (See Table)

The course itself which will be presented in the three-day clinics in January consists of three parts each of which is fully covered by the special training manual. Subjects presented include: (1) The preliminary screen, the weighted application, and the personal or telephone check-up; (2) The patterned interview, and (3) Interpretation of the patterned interview.

The recruitment phase, or that part of the program dealing with the methods for obtaining applications, is covered in a separate manual. Although this manual is not numbered as a part of the three-phase selection process, it is an essential element of the training course.

The need for this type of program became evident several years ago when Servel was conducting its Sales Seminar. Very probably, if appliance selling had not been stopped because of the war, the salesman selection program would have been made available much sooner. Fortunately, however, it is perfectly timed to answer the gas industry's postwar needs.

This selection program was developed in co-operation with Dr. Robert N. McMurry, a nationally known authority on personnel administration.

The first step in the development was the investigation of past practices and experiences of gas companies in hiring appliance salesmen so that a definite pattern could be established.

Dr. McMurry, working with Servel representatives, called on 50 operating gas companies in every part of the country. In so doing they studied the records of more than a thousand gas appliance salesmen—those who had

FIVE PRIMARY OBJECTIVES OF SERVEL'S SALES TRAINING COURSE

1. To enable the sales manager to use selection methods to obtain the best possible results from his experience and judgment.
2. To insure that every applicant who has a reasonable probability of success shall be employed.
3. To save as much time of the sales manager or sales supervisor as possible.
4. To eliminate, as early in the selection program as possible, all applicants who are clearly unsuited to work as retail gas appliance salesmen.
5. To process all applicants as rapidly and efficiently as possible to insure maximum goodwill for the gas company.

FOUR STEPS IN SCIENTIFIC SELECTION OF SALESMEN

1. A brief, preliminary screening interview to eliminate from further consideration those who are obviously unfit for sales work.
2. A weighted application form designed as a second, finer screen to exclude those whose general lack of qualifications are such that they have little chance for success.
3. A technique for obtaining from previous employers a complete and honest appraisal of the applicant's success or lack of it with them.
4. A Patterned Interviewing procedure designed to provide a complete picture of the applicant's suitability for the job and if he has any traits which might make him a problem.

John E. Covey

President, Covey's
Little Rock, Arkansas

Is Enthusiastic About Coleman Heating Equipment:

"I've Sold 2,000 Coleman Floor Furnaces With Minimum Service and Maximum Profit! It's My Line for Good"

"My six years' connection with Coleman products have been happy years," says this outstandingly successful dealer. "Coleman has complete public acceptance, and I personally believe that their merchandise is the finest on the market. Records show that approximately 70% of the floor furnace sales in our area are Coleman. I am eagerly awaiting Coleman's new post-war products, because I know I can sell them with absolute satisfaction to the customer, and with a profit to myself."

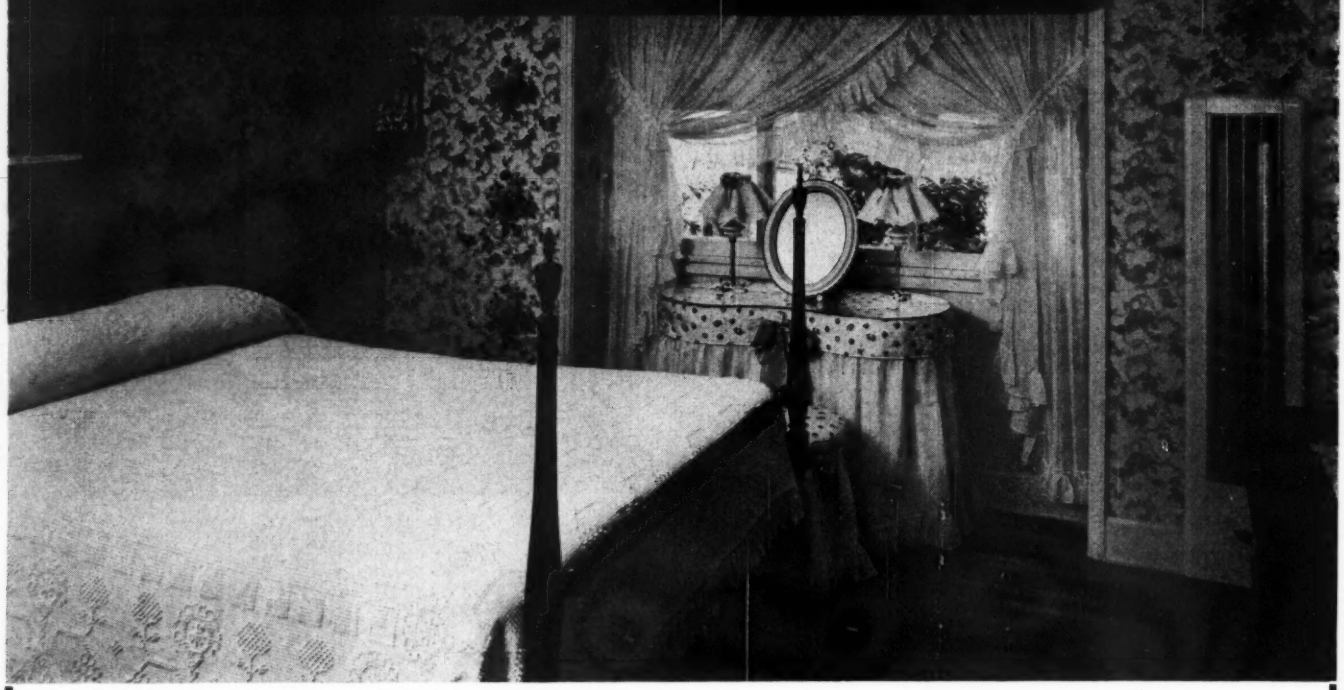
Coleman franchise dealers are being appointed now by America's leading distributors for post-war sales of the complete Coleman lines of gas heating equipment—including floor furnaces, central heat plants, and water heaters. This franchise is awarded to aggressive dealers who can qualify and handle the volume of Coleman business they can easily develop. Write us for the name of your Coleman distributor, who can tell you the complete story of the Coleman opportunity in the waiting billion-dollar home-heating market. Coleman Lamp and Stove Company, Dept. G-5X, Wichita 1, Kansas.

THE "HOT" NAME IN HOME HEATING

Coleman

THE COLEMAN LAMP AND STOVE COMPANY • WICHITA 1 • CHICAGO 11 • PHILADELPHIA 8 • LOS ANGELES 54 • TORONTO, CANADA

NEW CONTRIBUTION TO HEATING COMFORT



PANELRAY, the new name in home heating, is a post-war gas heater available now. It adapts nature's own heating method of warmth through radiation by sending out millions of infra-red rays which provide immediate warmth and comfort to the "living zone" of the room. Day & Night Manufacturing Company has perfected this modern-type heater to give instant, low-cost comfort.

Installation is simple as the heater stands entirely above the floor, requires no floor cutting or substructure and fits in standard 4" stud walls. It comes in a package ready to install in either a new or old building, upstairs or down. The PANELRAY is available in single units of 10, 20 or 30,000 BTU and dual units of 20, 30 or 40,000 BTU.

The PANELRAY features the Day & Night "heat trap" flue, which is scientifically designed to make the most efficient use of heat provided by the burner.

WRITE FOR FULL COLOR BOOKLET GIVING COMPLETE STORY

DAY & NIGHT MANUFACTURING CO.

MONROVIA, CALIFORNIA

been successful and those who had failed—and personally interviewed several hundred of them.

This wealth of information about gas company salesmen revealed many characteristic patterns. From these it was possible to determine the points of difference between success and failure in appliance selling.

Although this procedure of the four steps may sound academic, in actual practice it has been accepted by sales authorities as one of the most practical methods yet devised for scientific personnel selection.

After having devised the plan, it was necessary to get its total acceptance by the gas industry. Accordingly, Servel submitted it to the American Gas Association for their preview. Their reaction was so favorable that they specifically requested that the Servel Salesman Selection Program be included as the first step in their four-phase program for the selection and training of gas appliance salesmen.

Although the American Gas Association and Servel hope to acquaint the majority of gas companies with the new program by means of the seven regional meetings, arrangements are also being made to furnish information to those companies which could not be represented. It is suggested that any gas company executive who wishes such information write R. E. Williams, Chairman, Committee on Selection and Training of Sales Personnel, Residential Gas Section, American Gas Association, 420 Lexington Avenue, New York, N. Y.

Manual Tells How to Select Foremen and Supervisors

The National Foremen's Institute, Inc., Deep River, Conn., has brought out a 53-page manual entitled, "How to select Foremen and Supervisors," by R. C. Oberdahn. Included in the text are such topics as (1) What is a Foreman?; (2) Duties of a Foreman; (3) Old Method of Selecting Foremen; (4) New Method of Selecting Foremen. A breakdown of topic 4 includes preliminary selection of candidates, establishing tests, establishing minimum test requirements, character investigation, and a review of record and final approval. The book is clothbound, size 5½x8 in., and priced at $2.00.

FPC Denies Rehearing On Memphis Application

Because "no new facts have been presented", the FPC on Dec. 14 denied the petition of the Public Service Commission and the Department of Conservation of Louisiana for rehearing on its order of Nov. 21, 1944, issuing a certificate of public convenience and necessity to the Memphis Natural Gas Co. to construct and operate additional facilities in Arkansas, Mississippi, and Louisiana to serve its present customers.

Five New Postwar Appliances

By FRANK WEISS

Assistant to the Vice President, Southern California Gas Company

WITH the restriction placed upon work not essential to the war effort, and with all of the gas appliance manufacturers with design and research laboratories working full time on war production, the P.C.G.A. sub-committee for New Types of Gas Appliances has been faced with the task of trying to make progress under difficult conditions.

At the outset of our assignment it was agreed that we would endeavor to have produced at least one model of the appliances which we had hoped to have placed on the market with the lifting of war restrictions.

We early abandoned the idea of small table appliances for the reasons that we could find no one willing to attempt their design because of war work and the obstacles to be overcome if they were to stand up in the market with competitive devices which already had wide distribution and good public acceptance.

The committee, therefore, decided to direct its efforts toward five items:

1. A built-in hydraulic dishwasher.
2. A portable hydraulic dishwasher.
3. A counter height gas refrigerator with separate drawers instead of a single door for handier food storage and conservation of cold air.
4. A vented bathroom heater to more than meet the best competitive type heater for bathroom use.
5. A small gas fired clothes drier.

Item No. 1, the built-in dishwasher, adds substantial gas load; also, its demand for hot water is such that competing types of water heaters should be oversized if an adequate supply of hot water is to be had at all times. Gas water heaters, however, due to their quick recovery, if originally correctly sized for other household needs, will usually do the job. Briefly, this built-in unit requires only water connections for a complete and efficient dishwashing operation. Normal water pressure of 40 lbs. or more, through special recirculating jets, scrubs, scalds and rinses the dishes in a rotating basket. A hydraulic lift raises dishes from tub to drainboard level for easy loading.

This dishwasher has been little more than under test since 1937 because, until very recently, its production and direct sales were conducted by the inventor almost single handedly, with the exception that even though the appliance might have become an orphan, the local gas companies thought so well of it that they did some promotional work with it prior to 1941. This was done to provide sufficient installations to determine customer satisfaction, and with contemplation of ultimate needs for fully equipped gas kitchens.

Recently, ownership of the patents changed hands, whereupon the committee chairman got in touch with the new owner to lend every possible assistance toward getting this device produced on a volume basis for national distribution at a price within the reach of people of modest income. Before offering this assistance the chairman personally inspected several installations, including some made in 1937, and all of the rest made prior to 1941. Now it can be reported that this device continues to give a very high degree of satisfaction, even for the first installations made in 1937.

The chairman's survey disclosed that in each instance the owner could be rated as enthusiastic rather than just satisfied. All stated that if they were to move to a new location they would buy another dishwasher of the same type even though the same high price would have to be paid. Two of the housewives stated that they had previously owned electric dishwashers which they discarded within six months as unsatisfactory, whereas their hydraulic dishwashers were so sanitary, odorless, and did the dishwashing so easily, they would not part with them under any circumstance.

Laboratory checks have substantiated the manufacturer's claim that on the average 15 gals. of additional

FRANK WEISS, assistant to the vice president in charge of sales, Southern California Gas Co., has served the industry throughout the past year as chairman of the Pacific Coast Gas Association's subcommittee for New Types of Appliances. This subcommittee functions under PCGA's Committee for Gas Industry Development which has as its chairman HARRY L. MASSER, executive vice president of Southern California Gas Company. Mr. Weiss has been a gas man since 1904 when he went to work for the Los Angeles Gas and Electric Co. as bookkeeper. In 1911 he was promoted to manager of new business and later to manager of sales and advertising. At the present time, in addition to his duties as assistant to the vice president, he is manager of the Natural Gas Bureau.

ADVANTAGES OF THE AUTOMATIC DISHWASHER

1. The additional monthly gas revenues per dishwasher unit are estimated to start upward from a low of about 35c per month for natural gas in territories such as Los Angeles.

2. The additional revenue may be somewhat of that beautiful color which our Rate and Appraisal folks so dearly refer to as "increment load."

3. Installations and servicing will be by plumbers.

4. For old construction it is a fine vehicle to induce installation of automatic and larger size water heaters.

5. For new construction present sizing charts list 20-gal. tanks as the minimum for two and three bedroom houses with one bath, but with this dishwasher specified gas hot water heaters of much greater capacity would be encouraged.

6. It should be a substantial addition to our domestic appliance family, considering in this regard the prolific past and present intention of "that family across the road."

7. It adds strong reasons for using quick recovery water heaters and they, of course, are gas fired.

8. Customer's first cost and operating costs will be less. Another convincing reason to use gas.

9. It is an important step in the direction of the fully modern gas kitchen.

hot water will wash, rinse, and practically dry a day's dishes for the average family. In home operation, however, the average usage of hot water will be found considerably higher due to the washer being frequently allowed to operate longer than is really necessary.

Appliance No. 2 is another dishwasher, almost unknown and probably not patentable, although a patent was applied for. It was almost "backyard manufactured," and at least one similar item came on the market in a small way. Prices ranged from $18.75 to $39.50. It was a spun job, hand assembled, did a good dishwashing job, but had two drawbacks. It was too big to go on a kitchen shelf, and will continue with this drawback: and the price was excessive. Mass production with pans pressed instead of spun, it should retail for around $10.00.

Through the efforts of the committee one large manufacturer is now investigating this item for volume production and national distribution. Gas revenue for this item has been found to average about 50c per washer per month, using natural gas at Los Angeles rates. It is a portable item for people in the lower income brackets and under no circumstances should it be promoted by utilities at the expense of the built-in hydraulic dishwasher. It does a job that is labor saving and helps to avoid dishpan hands, but unlike dishwasher No. 1 it is not an aristocrat entitled to associate with our present five major domestic services which furnish the best in cooking, water heating, refrigeration, heating and complete air conditioning.

Appliance No. 3 is a counter height gas refrigerator, a definite "must". That is all that the committee can presently say on this subject, other than to add that it has expended more time and effort on this one item than on all the others combined.

Item No. 4 is a vented bathroom space heater. Perhaps you already know that our competitors are coming out with a newly designed, almost body length, radiant heater. Well, so is the gas business, and referring again to Los Angeles rates, it will provide substantially more heat at considerably less cost. Also its installation in new construction, including vent, can probably be made at equal or less cost than for the competing type.

At the request of the committee, models have already been designed, produced and installed for testing in several homes recently completed by one of the largest home building companies in southern California.

The committee believes that with energetic promotion this new appliance will go a long way toward lessening the number of installations of electric bathroom heaters.

Item No. 5 is a small gas-fired cabinet for the drying of stockings and underwear not usually sent to the laundry. This item is still in process of development by one of our local manufacturers. Intention is to size it for bathroom, back porch or any location where a small amount of space can be made available.

Underground Storage to Ease Pittsburgh's Peaks

THROUGH the underground storage of 5½ billion cu. ft. of natural gas, the largest in the company's history, and the drilling of 159 new gas wells, The Equitable Gas Co. of Pittsburgh is in a better position this year to meet the heavy needs of war industries and regular residential demand, according to Vice President D. P. Hartson.

Equitable began its underground storage of gas in 1934, and since then has developed four storage pools in Pennsylvania and West Virginia. Of the four, No. 3 is the most outstanding. It is located in Taylor county. W. Va., about 120 miles from Pittsburgh. Since it is near the company's main transmission system, it is very easy to connect this pool to both the high and low transmission lines. Its ultimate capacity of almost 3.000,000 Mcf and its intake and outlet through 4 wells producing from the 50 ft. zone in Mcf is twice that of the other pools.

All storage pool units are arranged so that storage pressure can be maintained at a 24-hour operated compressing or regulating station, and withdrawal is accomplished by feeding directly from the storage pool into the high, intermediate, or low pressure transmission system.

Fifty-six per-cent of Equitable's total send-out goes for industrial purposes, most of it war work, while the remaining 44% is for essential civilian services. Some of the munitions that natural gas helps to produce are the modern tank, for hardening and drawing of projectiles and gun barrels, forging aluminum airplane propellors, carburizing engine parts, melting glass for the manufacture of range finders, heat treating bombs, shell cases and armorplate for ships and planes.

In the case of the tank, gas is used for some 15 different heating operations in hardening the all-important armor plate, which must be hard enough on its outer surface to offset artillery fire and sufficiently tough and resilient on its inner surface to prevent shattering. Today, with natural gas, this result can be obtained in about 100 hours as compared to the 400-600 hours required for a process of this quality during the last war.

Additional Reserves Sought For Tennessee Gas Line

At least 76,500,000 cu. ft. of natural gas which is now being wasted daily in Texas, or which is without a market, will be conserved under proposals filed with the Federal Power Commission by Tennessee Gas and Transmission Co. which has just placed its $54,000,000 Texas-West Virginia pipe line into operation. (GAS, Nov., 1944, p. 15).

Gardiner Symonds, president of Tennessee Gas, petitioned the Federal Power Commission for permission to connect the line with 11 Texas oil and gas fields now having no outlet, and stated that the maximum daily take may run as high as 151,000,000 cu. ft. a day. The company has asked for an early hearing, but no date has yet been set.

In Postwar—

YOU WILL SELL WARMTH PLUS HEALTH WHEN YOU SELL WARD FLOOR FURNACES

When restrictions are lifted and you can offer Ward Floor Furnaces to your customers, you will sell much more than warmth alone. You'll sell convenience, economy—health. For instance:

Ward's Built-In Thermo-Control regulates temperatures evenly, prevents sudden temperature changes.

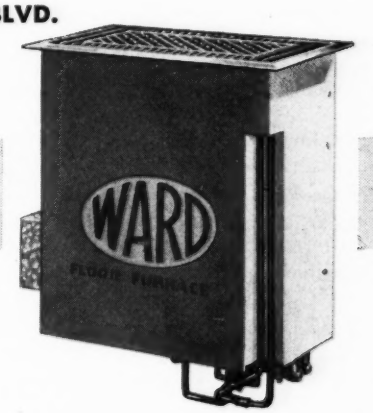
Ward's Cradle Circulator distributes warmth evenly into all corners, does away with drafts or sudden blasts of heat.

Ward's Sealed, Vented Combustion keeps air from contacting flame and carries all fumes outside the house.

These healthful features are a few of the many advantages resulting from Ward's 35 years of experience in building floor furnaces.

WARD HEATER COMPANY

1800 W. WASHINGTON BLVD.
LOS ANGELES 7, CALIF.



TRENDS AND COMMENT

"War Emergency" Rates

Rates of the Southern Counties Gas Co., Los Angeles have been reduced $750,000 annually in the first order issued Dec. 4 by the California Railroad Commission under its general tax investigation instituted last year. The new rates became effective Dec. 15. Except for the $32,000 reduction in the company's Santa Monica district due to a change in the minimum, the balance, or $718,000, is made in the form of a discount rate to be effective for a 12-month period.

The commission has followed its usual practice of providing for all expenses, including taxes. In other words, the reduction in taxes, according to Assistant Director Roy A. Wehe of the commission's Public Utilities Department, is merely a secondary factor, and is that reduction which comes about because of lower revenues. Since the point of entry of excess profit tax is below the rate of return allowed, the utility will still pay excess profit taxes to the federal government under the new rates.

Texas Gas in Canada

UNION Gas Co. of Canada, Ltd., serving a major portion of southwestern Ontario, has entered into an agreement with Panhandle Eastern Pipe Line Co. for the purchase of natural gas totalling more than five billion cu. ft. per year, according to an announcement Dec. 20 from the Canadian company's head office in Chatham, Ont.

T. Weir, general manager, disclosed that the agreement is contingent on two main conditions: (1)—That the United States permit the export of the natural gas required; (2)—That Union Gas and its subsidiaries, the Windsor Gas Co.. of Windsor, Ont., and the City Gas Co. of London, Ont., receive sufficient revenue for the gas to enable it to carry out the contract.

If the plan goes through, the problem of natural gas supply in southwestern Ontario, both for domestic and industrial users, would be solved for at least 20 years. Gas would be provided to heat the 10,500 homes which, since the start of the war, had to be converted to other fuels in order to release gas for war plants.

Weir estimated that the peak-load would be about 50,000,000 cu. ft. per day and the maximum supply available under present conditions about 30,000,000 cu. ft. with future supply uncertain.

Purchases under the new agreement would be delivered to Union Gas through eight months of the year, from April to November, and the gas would be stored in old wells in the Dawn field for delivery to consumers through the year as needed, according to Weir.

To carry out the agreement, the Canadian company would incur capital expenditures of about $3,000,000 and a large annual outlay for the gas. Pipe lines would have to be built totalling 70 miles in length, including a portion under the Detroit River. Compression plants would also be needed to pump the gas to the Dawn field, whose wells Weir described as "ideally suited for storage purposes."

Repressuring in Oklahoma

Use of natural gas to repressure the four-counties West Edmond oil field near Oklahoma City, Okla., has been proposed as a result of conferences of operators in that area.

The Oklahoma Corporation Commission was told, in connection with a hearing on application of J. Steve Anderson, vice-president of Anderson-Prichard Oil Co., for reduction of allowables in the field, that surveys indicate that there are still some 800,000,000 bbls. of oil in place in the field and that several hundred million bbls. of additional oil can be recovered by these methods.

In addition to a continuous study of reservoir conditions made by the West Edmond Pool Engineering Association and the conservation department of the Oklahoma Corporation Commission, an engineer of the United States Bureau of Mines has started a preliminary survey.

Based on showings of engineers that there was an average decline in pressure of 164 lbs. per million bbls. in March of this year and further pressure drops in August to 145 lbs. and in November to 125 lbs., the Corporation Commission reduced the daily allowable production of the West Edmond field to 150 bbls. per day. Allowable was set in the field in March, 1944 at 300 bbls. per day. This was reduced on May 15 to 200 bbls. per day based on showing of further pressure drops and, effective Dec. 1, the present reduction of daily allowables from 200 bbls. to 150 bbls. became effective.

Reasons for reductions of allowables are to secure greatest possible ultimate recovery from the field by utilizing the dissolved gas drive to its fullest, controlling water intrusion and harnessing the water drive so that it can be used as a propelling force when the dissolved gas drive is depleted.

Recommended Sales Policies for Gas Utilities

Believing that gas utilities must undetake and continue full responsibility for leadership in gas appliance sales in their respective communities, the Executive Board of the American Gas Association has recommended certain sales policies for consideration in promoting the sale of gas appliances and gas service. These policies, which are offered as suggestions only, follow:

1. That national, regional and state gas associations should cooperate with all similar national organizations in all allied fields.

2. That gas utilities should perform the task of promoting the sale of new and improved gas appliances to the point of assured customer acceptance.

3. That as customer acceptance materializes, the activities of the gas utility should be continued in such a manner as to maintain continuing acceptance of gas service and to increase the flow of gas appliance sales through normal channels of distribution.

4. That the gas utility should assume responsibility for gas appliance sales training of personnel (utility and dealer alike), utilizing the cooperation of gas appliance manufacturers.

5. That the gas utility should assume responsibility for training dealers in installation and service techniques, utilizing the cooperation of gas appliance manufacturers.

6. That the gas utility should keep dealers informed as to the increased merchandising opportunities offered to them in the gas appliance field, e. g., additional lines, new products, new rates, etc.

7. That the gas utility should inform all concerned with home construction and financing on all matters having to do with gas equipment and gas service.

8. That the gas utility should provide or make available to dealers facilities for financing gas appliance installment sales as attractive and advantageous as the utility's own.

9. That the gas utility should initiate and promote appliance sales campaigns with cooperating gas appliance dealers.

10. That home service and all other aids maintained by the gas utility should be made available to cooperating gas appliance dealers.

11. That the gas utility should provide full information as to its policies and practices so as to establish a relationship of mutual understanding and confidence with the dealers.

Postwar Glamor Products

J. H. Ashbaugh, vice president of Westinghouse Electric and Manufacturing Co. makes the following statement regarding the immediate postwar future of electric appliances in an article published in a recent issue of *Petroleum Industry Electrical News:*

"There has been reams of material published about the new and glamorous postwar products. Most of these amazing new devices come from those people who have no responsibility to produce them, sell them or service them. These new designs are being talked about by the artists and manufacturers making basic materials but I have not heard of any automobile company predicting a rear engine car—but I have seen many artist's pictures of such a car. It is a time consuming program to bring out a new product or even make major changes in an existing product.

"The immediate postwar appliances will not be far different from those on the market in 1940 and 1941. These appliances had a consumer acceptance far beyond their availability, and this demand has been pyramiding since then. Many new models were announced late in 1941 and were on the market only a few short months before production was stopped. In many cases the consuming public was hardly exposed to them. Thus, by going back into production on the basic designs of prewar we will be accomplishing the best results—for the consumer, as he will get quality, proven merchandise quickly; —for the dealer and distributor, as we will get him back into business with no risk of untested and untried products;— for our own employes, as it puts them back to work quickly thus permitting them to purchase goods in general to help stabilize business once more.

"I don't mean to infer by what I have said that over the long pull you won't see changes. You will, and plenty of them. In the past four years this country has advanced twenty years at least, technically. It will require a few years to gradually get these improvements and changes into production."

Note from the Wall Street Journal (Dec. 29): "This decline in inventories is impressive even for wares, whose sale has been retarded by rationing. In October, 1943, *there were* 181,000 *oil heating stoves in the hands of dealers distributors; by last month the number had declined to* 75,000. *In the same period gas cook stoves declined from* 101,000 *to* 74,000."

Gasoline from Gas

Through use of a new engineering development of the Fischer-Tropsch process, The M. W. Kellogg Co., petroleum and chemical engineers of Jersey City, and New York, can now produce gasoline with a clear octane number of 75 motor (83 research) from natural gas for about 5¢ per gal., according to a company announcement. This brings gasoline synthesis from natural gas within the range of successful commercial operation by the American refining industry. The process is equally adaptable to the economical production of high cetane Diesel oil.

The 5¢ cost is based on natural gas at 5¢ per Mcf. and a plant depreciation rate of 10% per year. The gasoline produced can be leaded to 80 motor (89 research) with 1 cc. T.E.L. for postwar consumption.

Based on years of technical exploratory and development work in the Kellogg laboratories in Jersey City, the new Kellogg method claims to overcome the problems of heat dissipation and accurate temperature control. By this new process, a yield of 80% of 75 octane motor (83 research) gasoline is obtained as a major product compared with the prewar European yields by the then existing methods of 30% to 40% of gasoline of approximately 25 octane number. Kellogg is prepared to build hydrocarbon synthesis plants employing this process.

The Kellogg Company first became interested in the possibility of making petroleum products from natural gas in the mid 1930's. After detailed study and development work along these lines at the company laboratories, a staff of company engineers went to Europe to study the methods employed there.

Designs for synthesis plants as developed by Kellogg now utilize natural gas which is doubtless the most favorable source as long as large volumes are available. However, the basic constituents can be obtained from low grade coal or other low cost, high carbon content materials when and if the supply of natural gas is no longer adequate.

Many states were represented at the annual "Holiday Foods" cooking party sponsored by Portland (Ore.) Gas & Coke Co. for newcomers to the city, many of them wives of war workers. Held in the company's "Hospitality House," the party featured a plump Oregon turkey, roasted at low temperature in a C/P gas range, and "all the trimmings." New Jersey, Georgia and Illinois are represented by the three ladies who head the line for "samples." Rita Calhoun, home service director, is doing the carving. The party was promoted entirely by space in "Newcomers' News," a local publication sent monthly to new families arriving in the city.

The "Big Inch" and Gas

Transmission of natural gas after the war from the Gulf coast to a point in Ohio or West Virginia, pumped through either the 24-in. or the 20-in. oil pipe lines, would make gas too expensive to meet competition of other fuels for industrial uses, in the opinion of W. H. Stueve, manager of the industrial department, Oklahoma Gas and Electric Co., Oklahoma City, Okla.

He expressed this view in a recent talk before the Engineers club of Tulsa. He was former power consultant on war emergency pipe lines and is familiar with the operations of the "Big-inch" and "Little-big-inch" oil pipe lines.

Stueve, in his Tulsa talk, estimated that the "Big-inch" unit cost the War Emergency Pipe Line Co. $77,000,000 to build. Use of this line and the 20-in. line for transmission of natural gas would involve a great deal of changing around, requiring addi-

P·C·G·A

TEL-U-TYPE

FLASH NEWS OF YOUR ASSOCIATION

The Cooperative Advertising Committee, comprising representatives of participating utilities*, met in December and completed plans for 1945, the 16th year of regional advertising on behalf of appliance manufacturers and gas companies.

"Consumer" advertising will continue with full pages in color in Sunset Magazine, Calif. Parent-Teacher and Calif. Federation News, and with black-and-white pages in Parent-Teacher Journal and Parent-Teacher Courier.

Trade Journal advertising in 14 magazines will cover: factories (general), commercial cooking, commercial baking, machinery and steel, architects, builders, building inspectors, plumber dealers and furniture dealers. ★ Publicity work is being resumed.

*Coast Counties Gas and Electric Company; Pacific Gas and Electric Company; San Diego Gas & Electric Company; Southern California Gas Company; Southern Counties Gas Company of California.

Watch This Column Monthly

THE WEST PREFERS GAS

tional expenses for compressor stations and when one considers the cost of gas transmission at relatively high load factors and using a base field price of 5¢ per Mcf., a delivery price at a point in West Virginia or Ohio of from 20 to 23¢ per Mcf., would result, Mr. Stueve told the engineers. "In terms of coal on a Btu. basis the gas cost would equal from $5 to $6 per equivalent ton of coal", continued Mr. Stueve. "In my estimation this would require that the gas company, operating either one of these pipe lines, sell its product to commercial and principally to domestic business to be able to earn a return on the investment. Then again good load factors become a problem."

He then asserted that the possibilities of the industrial areas claiming a greater percentage of the gas from the southwestern states was already, "alarming Texas, Louisiana, Arkansas, Oklahoma and Kansas authorities, who feel that if their reserves are depleted by shipping gas out of the southwest that it would bring ruin to the natural gas industry of their vast territory. This situation may have a benign influence on the use of these "big-inch" pipe lines for gas transmission."

The World's Oil

THE world's undiscovered reserves constitute a backlog of oil sufficient to supply civilization at the present rates of consumption for centuries, it is declared in a survey reported in Ethyl News, publication of Ethyl Corp. Predictions of shortages, it is held, are misleading since they are based solely upon known reserves, excluding prolific potential supplies in the untapped areas of many lands.

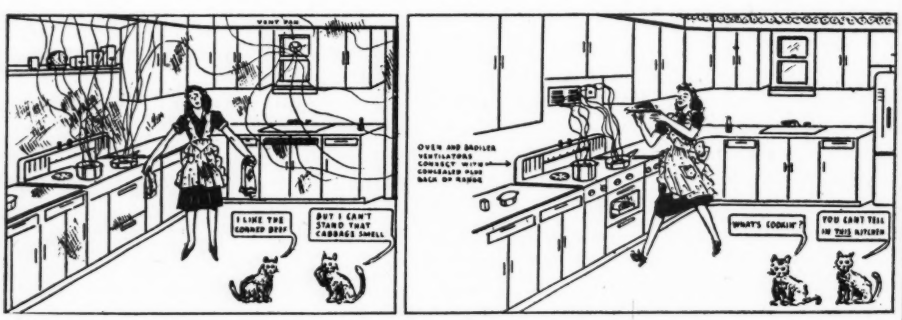
Promising areas yet to be exploited include the vast geosyncline extending in a great arc from Trinidad, B. W. I., down into Argentina, the survey adds. The area covered by eastern Colombia, Ecuador and Peru and possibly western Brazil is regarded as the most likely for the future development.

Interior areas of Ecuador and Colombia will be tested in the near future. Western Canada has a belt running from the United States border through Saskatchewan, Alberta, and the Northwest Territories to the Arctic ocean, which is expected to yield large quantities of oil. Alaska is another western hemisphere region that may become an oil producer of consequence. Still another prospective oil territory in this hemisphere is the East Coast of the United States, where oil companies have leased millions of acres from Florida to New Jersey.

The Middle Eastern countries of Iran, Iraq, Saudi Arabia and Kuwait have an estimated 15 billion barrels of oil—30% of the known world reserves today. North and east of the Persian Gulf fields is Russia, with vast areas of likely oil land. There are many fields in European Russia from the Caucasus to the White Sea, and there are frequent reports of new discoveries. A belt beginning at the Indian Ocean and running along the Afghanistan-India border, across India and down the eastern shores of the Bay of Bengal is prospective oil territory.

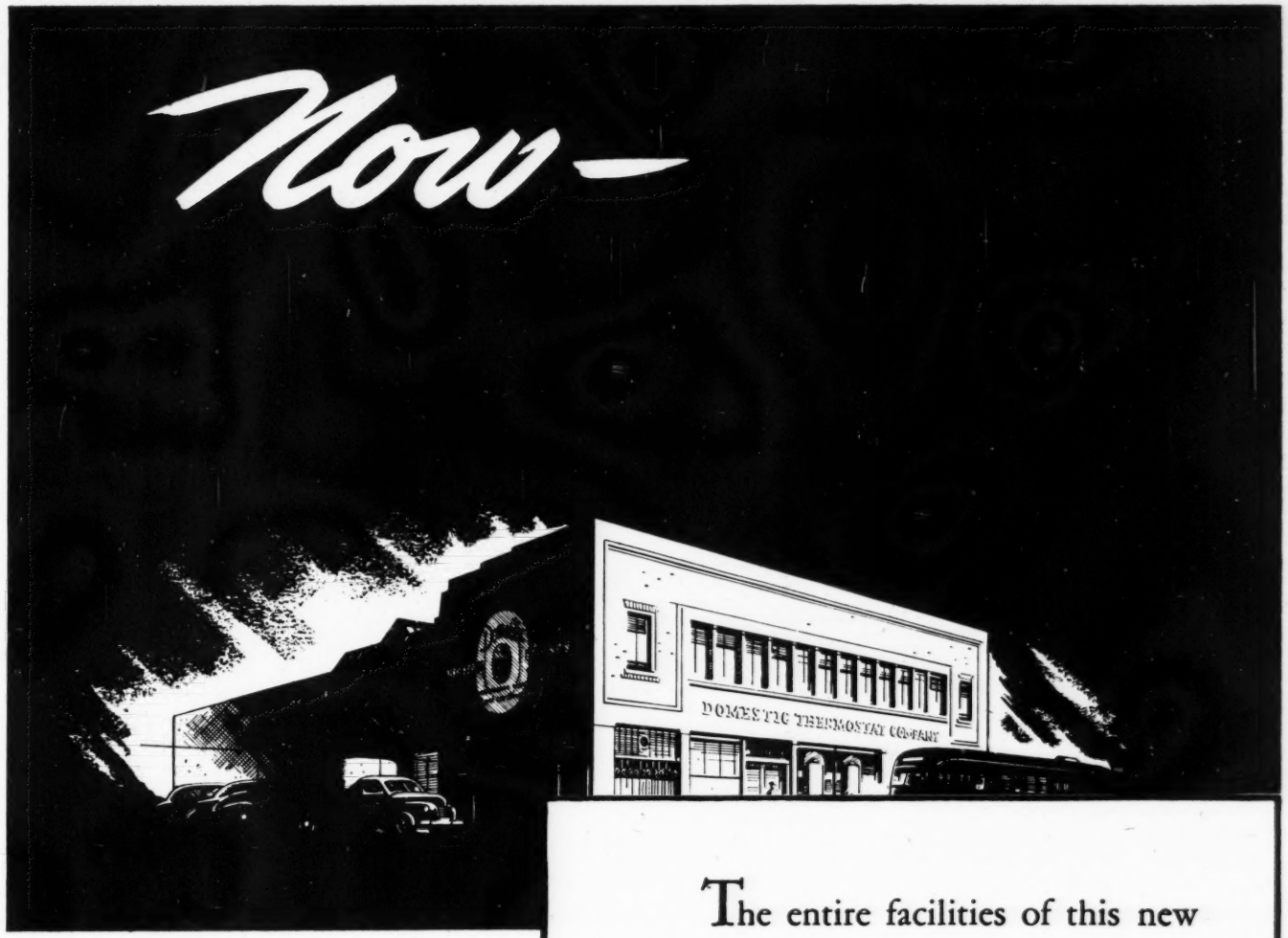
Production of 3000 barrels per day has been developed in the interior of China by three American oil men working for the Kansu Petroleum Administration. The success of the Kansu operation with makeshift equipment gives China ample reason to hope for ultimate oil self-sufficiency. Farther east are the Netherlands and British East Indies, where oil has been produced for years. Like most other producing regions, this, too, has been capable of supplying more oil than its market could consume and there was consequently no great emphasis on exploration.

Ignoring all potential sources of motor fuel other than earth-trapped pools of liquid petroleum, the survey concludes, there is still no basis to fear for the future of the gasoline engine.


I LIKE THE CORNED BEEF
BUT I CAN'T STAND THAT CABBAGE SMELL
OVEN AND BROILER VENTILATORS CONNECT WITH CONCEALED PIPE BACK OF HOOD
WHAT'S COOKIN'?
YOU CAN'T TELL IN THIS KITCHEN

Rochester (N. Y.) Gas & Electric Co. tells this kitchen ventilation story.

Now—



THEODORE THIELE, D. S. C. Ph. D.

HERE is one of the men responsible for developing Domestic models and testing gas appliances for efficient and economical operation . . . Mr. Thiele, one of the country's outstanding gas authorities, comes to us with an engineering background that dates back to European university degrees in physics and electrical engineering. In Switzerland, he carried on extensive developments in electrical and physical problems in connection with gases and gas turbines. Mr. Thiele was for many years Chief Test and Development Engineer of the Home Appliance Division for one of the nation's largest water heater and gas appliance manufacturers. Here he made a comprehensive survey of naural, manufactured and liquefied petroleum gases of the U. S. . . . The advice and consultation of Mr. Thiele in solving your problems are at your service.

The entire facilities of this new plant are devoted to the manufacture of thermostats and pilots for the gas appliance field. An organization of technical workmen, skilled in their profession – plus modern equipment – assures you and your customers of precision controls, engineered and built to give years of hard constant service.

Domestic

DOMESTIC THERMOSTAT COMPANY

156 W. PICO BLVD., LOS ANGELES 15, CALIF.

ASSOCIATIONS

IOCC Looks to Southeast for Gas Development

THE winter meeting of the Interstate Oil Compact Commission, at Jackson, Miss., Dec. 14-16, was carried to the Southeastern states with the hope of encouraging greater development of the oil and gas industries in that section and promoting the cause of conservation. E. G. Dahlgren, assistant secretary of the commission, reported that attendance reached 471.

Alabama and Florida, two of the newest arrivals in the column of oil and gas producing states, were given prominent places on the program. Oil was discovered in Alabama on Feb. 15, 1944, and Florida joined the oil producing states in 1943.

"The South is on the threshold of intense progress of agricultural diversification and industrial growth which will leave such old powers as cotton and tobacco as still important, but not overbearing factors in a balanced economy", declared Dr. John J. Grebe, director of physical research, Dow Chemical Co., Midland, Mich. A really big chemical development awaits that section through cheap power developed from its supplies of petroleum, gas and coal, he predicted.

Within five years Mississippi has discovered 10 new oil fields, William Clifford Morse, director, Mississippi Geological Survey, said. In addition to two original gas fields and three original oil fields, eight new oil fields and one new gas field have been discovered, Mr. Morse reported.

The regulatory practices committee submitted a report on expanding markets for gas, its increased transmission beyond areas in which it is produced and the advisability of setting up proper legal standards concerning the functional uses of the product.

Chemical compounds, such as the phenols, aldehydes, ketones, creosoles, organic acid, resins, plastics, explosives, and synthetic rubber have been made from natural gas, refinery gases, or these gases in combination with petroleum products. The report estimates that on a weight basis the 1944 yield of crude oil in the U. S. will approximate 240,000,000 tons and natural gas, 100,000,000 tons. Even with expanded use for chemical production from petroleum and natural gas, total 1944 production will consume less than 1% by weight of petroleum and natural gas produced for this year.

WHERE NATURAL GAS WAS MARKETED IN 1943

The natural gas industry, during the past three years, has undergone considerable expansion. For the year 1942, however, the states now included in the Interstate Oil Compact produced 80% of the total reported gas marketed. Last year's production was marketed as follows:

Field Consumption	20.8%
Domestic Use	14.6%
Commercial Use	5.8%
Carbon Black Manufacture	8.7%
Petroleum Refineries	7.4%
Electric Plants	8.3%
Cement Industry	1.4%
Other Industrial	33.0%

The accelerated expansion of the natural gas market, which has been 36% in the past four years, and prospective future expansion, should bring about a more satisfactory price for gas at the well head, the committee believes. The price, at the well head in 1940 for the Appalachian states was 14.8¢ and for the southwestern states 2.1¢ per thousand cu. ft., and the latter states marketed 68% of the gas. "Obviously," continues the report, "the price of 2.1¢ at the well head is below the intrinsic value of the gas. Better prices seem obtainable only through an expanding competitive market.

Referring to scientific efforts now being made to break up the atom, success in this field might mean that the utilization of gas as well as other materials, for fuel, eventually might be superseded entirely.

"With a rapidly expanding market, better prospective prices, and greater availability of equipment and materials, most of the gas now not being utilized for economic reasons, may be collected and saved. The gas producing states are now looking forward, under more advantageous marketing and price conditions, to the complete conservation of this natural resource now so beneficial to the American way of life," the committee concludes.

The Research and Coordinating Committee presented results of its survey of bottom hole pressures. Such data are of primary importance in conservation and proration of oil and gas. It also is of great assistance in estimating the reserves, predicting the flowing life of wells and selecting producing equipment, the committee found. The report however was confined to the data which relates to conservation and proration.

Members of Research and Coordinating Committee, IOCC, left to right: Lloyd Jordan, vice chairman, Arkansas; Jack Baumel, Texas; L. B. Taylor, past chairman, Kansas; E. G. Dahlgren (standing), technical secretary; S. F. Peterson, Illinois, and John Kelly, chairman, New Mexico.

CALENDAR

April

American Gas Association 22nd Annual Distribution Conference—Stevens Hotel, Chicago, Ill., April 4, 5, and 6.

American Gas Association, 5th Annual Conference on the Operation of Public Utility Motor Vehicles—Stevens Hotel, Chicago, Ill., April 4, 5, and 6.

Mid-West Gas Association, Spring Convention—Fontenelle Hotel, Omaha, Neb, April 9 and 10.

May

American Gas Association, Annual Spring Meeting Natural Gas Department—Hotel Gibson, Cincinnati, May 7 and 8.

June

American Gas Association 18th Annual Joint Conference of the Production and Chemical Committees—Hotel Pennsylvania, New York City, June 4, 5, and 6.

YOUR POSTWAR DOMESTIC GAS MARKET

What is the postwar future for Gas in the home? What sort of market can we expect for ranges, refrigerators, house-heating units and water heaters?

While this ugly war is not yet over, we are preparing studies, in cooperation with other market-minded agencies, devoted to these puzzling questions. We are doing this without in the least relaxing our wartime efforts. We want to be prepared—and we know you do too—for the Peacetime problems we devoutly hope are not in the too distant future.

The area served with Gas by the Pacific Gas and Electric Company in Northern and Central California has experienced a tremendous increase in population under the impact of war. This population growth represents your potential Domestic Gas market.

The following figures show the population and Domestic Gas customer trends for P. G. and E. territory projected from 1943 to 1950:

	Population	Domestic Gas Customers
1943	3,448,359	684,762
1944	3,456,297	696,199
1945	3,465,001	700,961
1946	3,502,914	716,669
1947	3,543,544	729,046
1948	3,624,150	742,354
1949	3,703,395	758,817
1950	3,783,183	775,375

★

This advertisement is one of a series devoted to the marketing of Domestic Gas equipment. These ads are presented as possible aids in solving the Gas-appliance merchandising problems of Tomorrow.

★

P. G. and E. PACIFIC GAS AND ELECTRIC COMPANY

Allis-Chalmers Produces Gas Turbine Film

The gas turbine, newest source of prime power, makes its motion picture debut in a film released by Allis-Chalmers Mfg. Co. entitled "Tornado in a Box". Explained in motion pictures for the first time are the development and operation of this unit which has been hailed as "the power plant of the future". At the same time, the film frankly indicates that a great deal more of the tremendous engineering effort already applied must still be put into gas turbine development before such potential success can be achieved.

The film, which contains no advertising, is being loaned free to any industrial or engineering group interested in showing it, and permanent prints may be purchased. It is a 16-mm. film, for use on sound projectors only. To borrow or purchase "Tornado in a Box" or other films, write the Allis-Chalmers Mfg. Co., 650 Harrison Street, San Francisco 7, Calif.

Rocky Mountain Ass'n Establishes Denver Office

The Rocky Mountain Gas Association has established offices at 327 C. A. Johnson Bldg., Denver 2. H. C. Kelly has been named office manager. G. M. Musick is president and Roy G. Munroe, secretary of the association.

Ferguson Named Executive Director of INGA

John A. Ferguson, for the past nine years a member of the Missouri Public Service Commission, has been appointed executive director of the Independent Natural Gas Association of America, E. Buddrus, Chicago, president of the association, has announced.

J. A. Ferguson

The appointment was made effective January 1, 1945. Mr. Ferguson will open offices in Washington, D. C., as soon thereafter as possible. Association offices will remain in Oklahoma City, Okla., with **Charles L. Orr,** continuing in charge as secretary.

Mr. Ferguson graduated in law from Indiana University and spent 22 months overseas as a first sergeant during World War I. After the war, he became U. S. Commissioner for the Eastern District of Missouri.

Later he was with the finance department of the State of Missouri and for six years was general manager of Mathews-Pebblefield Land Development Co.

Gas Turbine To Be Topic At Power Conference

A session on the gas turbine, a new type of prime mover expected to play an increasingly important role after the war, will be included for the first time on the 1945 program of the Midwest Power conference, Staton E. Winston, conference director, has announced.

Sponsored by Illinois Institute of Technology, where Winston is associate director of the mechanical engineering department, the conference will be held April 9 and 10 at the Palmer house, Chicago. An attendance of 2,000 to 2,500 is anticipated.

Winston said that the gas turbine has been rapidly coming to the foreground in recent years, due partially to wartime developments. It uses gas as a working medium in the production of power, in contrast to older types of the turbine, which use steam.

Various designs of the gas turbine, many of which are now in service, will be discussed at the conference. Problems involved in their utilization will also be taken up.

A.P.I. Historical Booklet

The Department of Information, American Petroleum Institute, New York, has issued a souvenir anniversary brochure entitled, "The Early Day's," to commemorate the petroleum industry's 85th anniversary, which was celebrated last year. Reminiscent of those days when the industry began (1859), the pink cover of the booklet is edged in an ornate wide brown border, with its title in an old fashioned type, and beneath it a tintype of Colonel Edwin Laurentine Drake, the man who brought in the first drilled well in the world on the banks of Oil Creek, near Titusville, Pa.

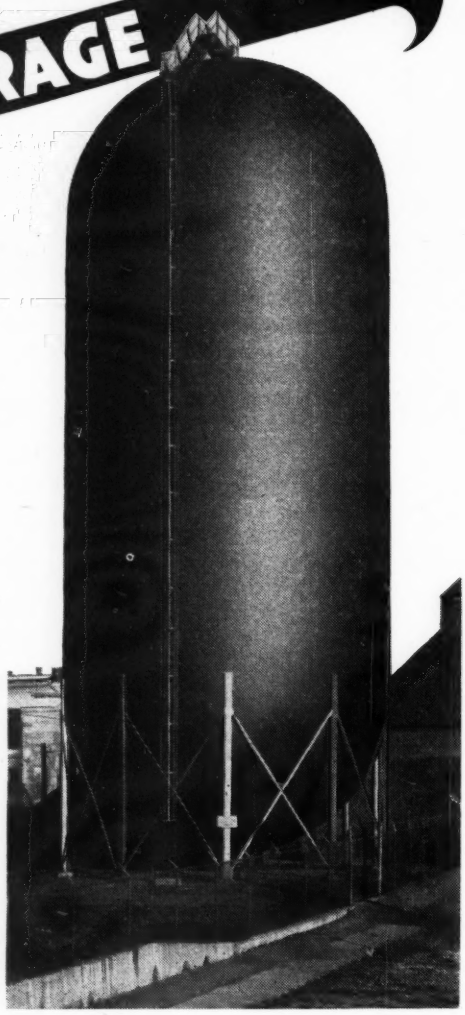
Copies can be obtained by writing the Institute at 50 West 50th St., New York 20, N. Y.

For adequate Reserve GAS STORAGE

Stacey "Bullet" type high pressure gas holders are widely used for reserve storage at the end of branch lines and against line breaks, and for use during peak loads or for serving outlying territories. Many natural gas companies are using Stacey Brothers "Bullets" in increasing numbers on local distribution systems.

We build this type of holder in capacities up to 500,000 cu. ft., and for pressures up to 100 pounds. They may be erected vertically or horizontally. Stacey Brothers "Bullets" have many exclusive features of design and construction which add greatly to their strength and durability. Let us figure on your requirements.

THE STACEY BROS.
GAS CONSTRUCTION CO.
One of the Dresser Industries
5535 Vine Street **Cincinnati 16, Ohio**



As far as is known, the Stacey Brothers all-welded High Pressure "Bullet" shown in the photo is the largest in the world. Its capacity is 400,000 cu. ft.

***High Pressure* BULLETS**

Stacey Brothers ENGINEERS • FABRICATORS ERECTORS • RECOGNIZED EXPERIENCE & FACILITIES

D. S. Kennedy To Lead Oklahoma Association

D. S. Kennedy, vice president and treasurer of the Oklahoma Gas & Electric Co., Oklahoma City, Okla., was elected president of the Oklahoma Utilities Association, at a meeting December 14.

D. S. Kennedy

Mr. Kennedy succeeds **E. C. Joullian,** president, Consolidated Gas Utilities Corp., Oklahoma City, and will serve during the year 1945.

Other officers elected were: A. F. Potter, Bartlesville, first vice president; S. L. McElhoes, Chickasha, second vice president; E. C. Joullian, treasurer; and Miss Kate A. Niblack, re-elected secretary.

Association directors in addition to the president; two vice presidents and treasurer, included: R. K. Lane, Tulsa; J. Y. Wheeler, Sherman, Texas; W. L. Woodward, Alva; Glenn C. Kiley, Oklahoma City; Frank B. Long, Tulsa; W. R. Thomas, Ada; L. A. Farmer, Ponca City and J. C. Happenny, Sand Springs.

Utility Appliance Corp. Is New Name of L. A. Concern

To reflect more accurately the business of the company, Utility Fan Corp., Los Angeles, changed its name Jan. 1 to Utility Appliance Corp. Starting in 1925 as a manufacturer of ventilating equipment, the Utility organization now produces and distributes a wide range of air cooling, air moving, and gas-fired heating appliances.

Maurice Breslow, vice president in charge of sales, when commenting on the company's change of name, stated that, "Additional new appliances are being considered for manufacture after the war. These items will round out the company's line and assure capacity production for our expanded facilities and enable us to do our part in providing more jobs for more people."

Utility Appliance Corp. will occupy the more than five acres of floor space in its Los Angeles plants.

Berliners Beset by Reduction in Gas

It is reported that the good citizens of Berlin, Germany, are faced with severe restrictions in their consumption of gas this winter. Their high command has ordered a rigid reduction of 20% with an exacting penalty for non-compliance.

Word has it that the new order is chiefly due to the Allied bombardment of the Dortmund-Nembs Canal and resultant disruption of water-borne traffic, including the transport of coal from the Ruhr to the Reich capital.

Chinese Renew Interest In Approved Appliances

Liming Tseng, director of the Chinese National Bureau of Standards, Ministry of Economic Affairs, at Chungking last month expressed written thanks to the AGA Testing Laboratories for the Directories of Approved Gas Appliances and Listed Accessories which have arrived from time to time.

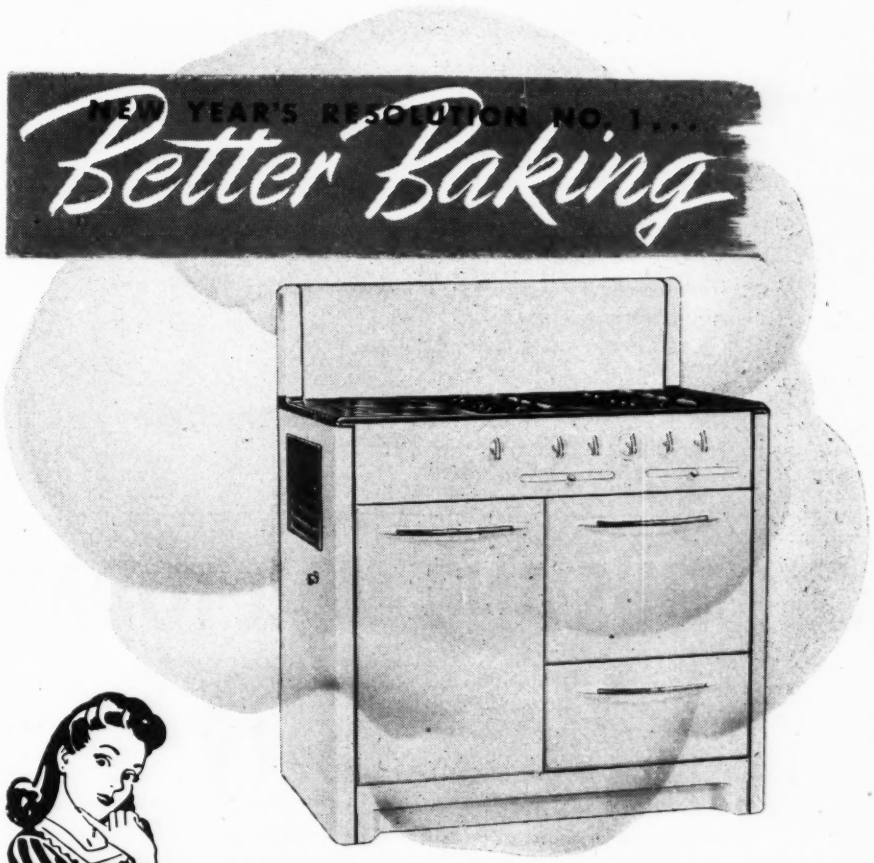
The letter, which was three months in transit, reopens correspondnce with the Chinese government from which the Laboratories had not heard since the United States entered the war. In former years the Chinese had displayed much interest in gas equipment requirements and testing procedures and made a number of requests for publications covering them.

Association Headquarters has, from time to time during the war, sent gas industry publications to the Chinese National Library at Chungking to aid in rebuilding that institution which was destroyed by the Japanese in their conquest of Nanking.

Cities Service Offices Set Up In Oklahoma City

Several officials of the Cities Service Gas Co., Nov. 20, established headquarters in the First National Bank Bldg., Oklahoma City, Okla., following removal from Bartlesville, Oka., of part of the offices.

Officials who located in Oklahoma City include: S. B. Irelan, president; George H. Baird, vice president in charge of operations; R. L. Morton, vice president and treasurer; Glenn W. Clark, vice president and general counsel; John E. Woods, head of the land and lease department, and Charles C. Hoffman, superintendent of the land and geological departments.



. . . with a WEDGEWOOD Gas Range!

1945's number one resolution for thousands of western homemakers is going to mean many more new WEDGEWOOD Gas Ranges, making many more new friends for gas. Women who bake *know* that a Gas Range has all the dependability of an old and tried recipe. They have come to rely on WEDGEWOOD's spun glass insulated oven, handy stop-catch flat bars, and the *oven-heat control* that assures perfect baking every time!

WEDGEWOOD THE MODERN GAS RANGE

JAMES GRAHAM MANUFACTURING CO.

LOS ANGELES ★ SAN FRANCISCO ★ NEWARK, CALIFORNIA ★ PORTLAND, OREGON

and THAT OPERATES UNDER PRESSURES UP TO 150 lbs. PER SQ. INCH?

• **This new lightweight shut-off valve operates equally well in either gas or liquid lines, has free unrestricted flow, is adaptable to all types of fuel and oil lines. No metal-to-metal contact, positive sealed with "O" type seal rings. It's accurately indexed to 90°, 180°, 270° and 360°. Simple in construction—it can be supplied in all styles and sizes for use as a drain cock, shut-off or selector valve in water, fuel or hydraulic systems. For complete information, write engineering department—indicate use or application desired.**

Whittaker

WM. R. WHITTAKER CO., LTD., 935 NORTH CITRUS AVENUE
LOS ANGELES 38, CALIFORNIA

CLIP THIS AND MAIL TODAY

IF YOU ARE NOT A REGULAR SUBSCRIBER TO **GAS**

In GAS each month you will find dozens of ideas that will help you know your business better and do your job better. Just one of these ideas coming to you on our pages can pay you many, many times the small cost of a subscription.

GAS . . . 1709 WEST EIGHTH ST.,
LOS ANGELES 14, CALIFORNIA

Please enter my subscription to GAS for . . .

2 YEARS $3.00 ☐ **1 YEAR $2.00** ☐

☐ Check is enclosed ☐ Please bill me

NAME_____ POSITION_____

COMPANY_____

STREET CITY ZONE STATE

CURRENT READING

Control and Detection of Reservoir Gas Movement in Pressure Control Operations—N. Van Wingen and E. P. Valby. "California Oil World," 2nd Oct. issue, 1944, pp. 28, etc. Reviews benefits to be derived in the control and detection of reservoir gas movements in pressure control operations. The well effluent analysis method described has been developed to aid in picturing what is occurring in such a reservoir.

Portable Amplifier for Locating Water in Gas Lines—F. H. Love. "Petroleum Engineer," Oct., 1944, p. 202. United Gas Pipe Line Co. has been most successful in the use of a portable amplifier to locate water in its lines. The equipment is also used as a pipe locator and as a means of following pipe line scraper runs, which sometimes result in the stoppage of a scraper and consequent difficulty of finding the lost equipment. The apparatus is described and illustrated.

Pipe Line Computing Charts—W. F. Martin. "Petroleum Engineer," Oct., 1944, pp. 191, etc. A chart is shown based on Weymouth's formula for gas flow through pipe lines. Its construction is described. An orifice meter chart is also shown for use in obtaining an orifice meter coefficient corrected for gravity and temperature.

Phase Equilibria in Hydrocarbon Systems—H. H. Reamer, R. H. Olds, B. H. Sage and W. N. Lacey. "Ind. and Engr. Chem.," Oct., 1944, pp. 956-958. The volumetric behavior of ethane was investigated at pressures up to 10,000 psi. in the temperature interval between 100° and 460° F. The results of the experimental work are presented in tabular and graphical form. Comparisons are made with values obtained by others in recent investigations and with extrapolations based on Beattie-Bridgeman equation of state.

Heating Value of Natural Gas—A. J. W. Headlee and J. L. Hall. "Ind. and Engr. Chem.," Oct., 1944, pp. 953-955. The total and net heating values of natural gas are related by the empirical equation: $THV - 1.072\ NHV = 34 - 0.34\ I$. This equation is used to check the accuracy of the corrections for the water of combustion of a water-flow gas calorimeter. The net heating value can be calculated from the total heating value by this expression, and vice versa. The suggested calorimeter practice will shorten the number of man-hours per test, increase the accuracy, and decrease the size of the test sample.

Design and Construction of Tap Changing Transformers for Cathodic Protection—E. G. Goddard. "Petroleum Engineer", Sept., 1944, pp. 182, 184, 186.

The Oxy-Acetylene Handbook, published by The Linde Air Products Co., is a new, durably bound, 600-page manual usable as a guide for self-instruction or a standard classroom textbook. It covers the entire range of the oxy-acetylene process, giving instructions for handling all the common commercial metals, together with simple explanations of the fundamental principles of the various methods of depositing and controlling molten metal.

Carbon Black Plant to Use Sweet Gas for Duration

Acting on an application of the War Production Board, the Oklahoma Corporation Commission, Nov. 29, issued an order granting the Cabot Carbon Co., permission to operate a $1,000,000 plant near Guymon, Okla., to manufacture channel process carbon black, using sweet natural gas produced in the Oklahoma sector of the Hugoton field. The plant will be constructed and owned by the Defense Supplies Corp. and leased to the Cabot Carbon Co., of Pampa, Texas.

In granting the permit, the Oklahoma Commission departed from precedent where it previously refused to permit the use of sweet gas for carbon black excepting where no other market was available. The permit was issued only for the duration of the war and six months, to aid in meeting a shortage of carbon black needed in the manufacture of synthetic rubber for heavy duty tires.

The company is permitted to use up to 30,000,000 cu. ft., of gas per day. The price was set at 5 cents per thousand cu. ft., one cent per thousand more than the OPA-approved ceiling price to the other carbon black plants at Guymon.

Texas Wastes 2% of its Gas

Approximately 2% of all natural gas produced in Texas is wasted, said Ernest O. Thompson, chairman of the State Railroad Commission, in a statement based on gas production and usage figures supplied by producers and processors, at the request of the commission, which currently is engaged in a study of gas conservation. Thompson declared that waste has decreased from 37% of production in 1935 to 4.3% in May of 1944, and that currently it is approximately 2%.

The roundup of production and utilization showed this distribution: Light and fuel, including gas transported by pipe line to Denver, Indianapolis, Chicago, St. Paul, Kansas City, Detroit and points in New Mexico, Tennessee and West Virginia, 36%; extraction loss in natural gasoline plants, 4%; fuel in such plants, 10%; repressuring of fields and recycling, 28%; used in lifting crude oil by putting gas back in the oil fields, 4%; manufacturing of carbon black, 16%; waste, 2%.

First High Pressure Main Installed In Vancouver

Installation of Vancouver's first large size high pressure gas main will now be proceeded with by the B. C. Electric Railway Co. at a cost of $60,000. The main will run from the company's gas plant at Keefer and Main Streets, to Sixth and Quebec, a distance of approximately a mile and a quarter.

The new main will be of steel pipe, 12 inches in diameter, and will be buried 3 feet underground. The pipe is now on hand and a start will be made on the work at once.

E. H. Rohrer, manager of the Gas Department of the B. C. Electric, states that the new main will mean an increase in production of gas is necessary as a result of the rapid growth.

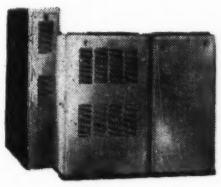
Linde Sponsors Course On Pressure-Welding

Beginning Jan. 15, The Linde Air Products Co. with the cooperation of Pressure Weld Co., Houston, Texas, will conduct a training course for the purpose of giving detailed instructions in the proper procedure to be used in pressure-welding overland pipe lines. The school will be held at the warehouses and plant of Pressure Weld Co. in Houston, under the direction of Linde service operator H. A. Yost, assisted by members of the Pressure Weld field force.

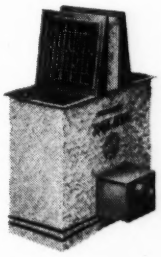
A welding clamp of the type used in the field, complete with the necessary auxiliary equipment, will be used to train the men under actual field conditions. Men are trained in small groups to give an opportunity for individual instruction. Each man who attends the school is provided with a specially prepared illustrated reference manual of the subject and, because he will actually operate the pressure-welding equipment, the trainee should bring work clothes with him. The average training period is about two days.

More than 50 welding operators, pipe line inspectors, and other interested field men representing 30 companies were instructed at a similar school held last fall. Oil companies, gas companies, and pipe line contractors in the vicinity of Houston sent selected personnel to the school for training.

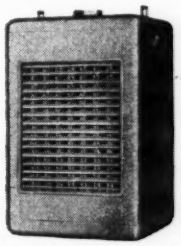
Complete information on the pressure-welding school may be obtained from the Houston office of The Linde Air Products Co., 6119 Harrisburg Blvd., Houston 11, Texas.



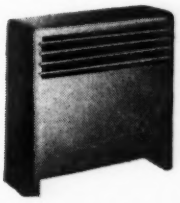
Forced Air Furnaces



Floor Furnaces



Unit Heaters



Circulating Heaters

Effective January 1st, 1945, our new name will be

UTILITY APPLIANCE CORP.

As the Company through the past twenty years has outgrown its former plants and equipment, so have our activities and products outgrown our name. The name Utility Fan Corporation was adopted when our principal activity was the manufacture of Fans and Blowers.

UTILITY APPLIANCE CORP. will more fully describe the Company's present and post war manufacturing and sales activities.

Additional new appliances are being considered for manufacture after Victory. These additional items will better round out the Company's line of products and will assure capacity production for our expanded facilities and enable us to do our part in providing more jobs for more people.

Utility Appliance Corp.

Formerly Utility Fan Corporation

4851 S. Alameda St.

Los Angeles 11, California

Peace-time manufacturers of the Famous Utility Air Koolers, Blowers, Fans, Floor Furnaces, Circulating Heaters, Unit Heaters, Forced Air Furnaces.

PEOPLE

• The Public Service Electric & Gas Co., Newark, N. J., has announced three personnel changes in the organization of its subsidiary, the Atlantic City Gas Co., Atlantic City, N. J.

Vernon F. Stanton is the new commercial manager, succeeding **Louis N. Yetter,** who has retired on pension. Stanton started with Public Service in 1919 as a clerk, and has been commercial manager for the company at Morristown.

Raymond H. Young, Atlantic Co.'s office supervisor since 1935, becomes assistant commercial manager; and **Hugh L. Wathen,** a commercial sales representative for Atlantic, is promoted to the post of appliance sales manager. Wathen started with the company as a gas appliance salesman in 1927. He became a sales representative in 1931.

• **John I. Yellott,** director, Institute of Gas Technology, Chicago, has announced the addition of seven new members to the staff.

Dr. Eric F. Lype, who will serve as a consultant for the institute's gasification projects and will do theoretical work on appliance projects, was formerly research engineer for the Combustion Engineering Co., New York, and the De Laval Steam Turbine Co., Trenton, N. J. He has studied at the Institute of Technology, Berlin-Charlottenburg, and the Swiss Federal Institute of Technology, Zurich, and has published a number of research studies.

Russell T. Griffith, instructor in chemical engineering at Illinois Institute of Technology since 1941, is one of three new scientists. The other two are **Eleanor Landon** and **Masanobu Miyaji.** Griffith, before his connection with Illinois Tech, was employed for eight years at the City Service Oil Co., East Chicago. A graduate of Purdue university in 1933, he received his M.S. degree from Illinois Tech in 1941.

Miss Landon, who is a graduate of Mundelein college and holds a master's degree from the University of Illinois, was formerly a research assistant for the American Meat institute.

Miyaji has worked as a chemist for the Marblehead Lime Co. and as a laboratory assistant for the Chicago Biological Research laboratory. He is a graduate of Illinois Tech.

Mrs. Ann Lesh, for three years librarian at the Armour laboratories, has been appointed research librarian. She is a graduate of Mundelein college, where she received her B. C. degree in 1940.

E A. Walsh and **John F. Schnacky** are joining the staff as assistant chemical engineers. Walsh has been associated since 1941 with E. I. du Pont, Niagara Falls, N. Y., and has previously been employed by the Titanium Alloy Mfg. Co. there. He holds a B. S. degree from the University of Michigan, where he was graduated from in 1940. Schnacky, a graduate of the University of Rochester in 1943, was previously employed as an engineer by the Phillips Petroleum and the Eastman Kodak companies.

N. W. Muller, formerly design engineer at the Whiting refinery of the Standard Oil Co. of Indiana, has been appointed to the staff of the Institute to work on the development of applications of the institute's new pulverizer.

He is a graduate of Mississippi State college and holds a master's degree in chemical engineering from the University of Louisville.

• **James W. Tyson, II,** was elected Dec. 18 as vice president of Eastern Gas and Fuel Associates, Boston, Mass.

J. W. Tyson

Tyson in 1934 became assistant treasurer of Koppers Coal Co., later the Koppers Coal Division of Eastern Gas and Fuel Associates. He will continue to make his headquarters in Pittsburgh.

A graduate of New York University, with the degrees of B.C.S., in 1926, and M.C.S., in 1929, Tyson, from October, 1921, to August, 1929, had been connected with the trust department of the Bank of New York, 48 Wall St., New York City. He came to Pittsburgh in September, 1929, when he entered the employ of the then Koppers Co. During World War I, Tyson served with the 110th Field Artillery, 29th Division, seeing overseas service from July, 1918, to June, 1919.

• **L. R. Lefferson,** head of the Rate Department of Ebasco Services Inc., New York, N. Y., has been named chairman of the Rate Committee of the American Gas Association by President J. French Robinson.

An authority in the field of rate engineering, Mr. Lefferson has an extensive background of operating experience as well as participation in Association committee work. He served as a member of the A.G.A. Rate Fundamentals Committee until it was discontinued in 1935 and, since 1939, has been a member of the Rate Committee.

Lefferson joined the staff of the Electric Bond and Share Co. as a rate engineer on April 1, 1918. He became assistant Rate Department head in 1926 and head of the department in 1933, retaining that position when Ebasco Services Inc. was formed in 1935.

• **C. V. Sorenson,** 1943-44 chairman, AGA Residential Gas Section Managing Committee, at a recent meeting held in Chicago, was honored for his leadership and his successful efforts in pioneering the Coordinated Gas Kitchen Program.

The Mettler "FAN-AIR" Gas Burner

IS A MECH'L DRAFT AUTOMATIC gas burning SYSTEM embodying electric and throttling control with "TRANSAXIL" FLAME GUARD PILOT all properly combined for safe, efficient combustion. It's the "post war" burner. Available now and prompt shipment of all sizes.

IDEAL FOR SCOTCH MARINE BOILERS

Mettler Entrained Combustion Gas Burners

FOR ALL Purposes Kinds of gas Pressures

BUILT UNDER PATENTS: JANUARY 25th, 1916 JANUARY 2nd, 1923 MAY 26th, 1925 NOV. 4th, 1926

LEE B. METTLER CO.

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SEMET-SOLVAY ENGINEERING CORPORATION

•

Blue Gas Plants — Gas Purifiers

Water Gas Machines — Condensers

Washer Coolers — Waste Heat Boilers

Naphthalene Scrubbers — Producer Gas Plants

40 RECTOR STREET, NEW YORK, N. Y.

1932 was transferred to the sales department as merchandise sales engineer.

• **L. D. Romig** was elected treasurer of the Southern California Gas Co. at a meeting of the board of directors on Dec. 20, according to an announcement by F. S. Wade, president.

Romig, who has been with the gas company since 1922, formerly held the position of assistant controller. He succeeds G. A. Detrick who has been forced to retire because of ill health. In addition to his duties as treasurer, Romig will serve as manager of the Tax Department.

• **G. S. Dawson,** has been promoted to the position of gas sales manager, B. C. Electric Railway Co., Ltd., Vancouver, B. C. according to an announcement by W. C. Mainwaring, vice-president. He joined the B. C. Electric in January of 1927 as a designing engineer in the construction department, and in 1932 was transferred to the sales department as merchandise sales engineer.

• **K. C. Porter** has been appointed district agent at Colusa for Pacific Gas and Electric Co. **C. R. Gill,** for many years district manager at Colusa has retired under the company's voluntary retirement plan.

• Luzerne County Gas and Electric Corp., Dec. 18, announced the retirement, at his request, of **R. R. Van Horn** as president of the company. **Charles E. Warsaw** was elected to succeed Van Horn, effective Dec. 31.

Warsaw, who has been vice-president and general manager since April, 1944, is a graduate electrical engineer of Iowa State College and since 1917 has devoted all of his activities to public utility work in electric and gas operations and construction work. He came to Luzerne County as superintendent of the Electrical Department in 1923, following employment in gas and electric subsidiaries with The American Gas Co., dating back to 1917.

Van Horn will continue as a member of the board of directors. He has been associated with Luzerne County Gas and Electric Corp. or its predecessor companies for more than 45 years.

• **Floyd Green,** general counsel for the Oklahoma Corporation Commission since July, 1942, was appointed attorney for the Oil and Gas Conservation department of the Commission, effective Dec. 1. He replaces **Earl Foster,** who has become secretary of the Interstate Oil Compact Commission.

He came to the Corporation Commission on July 1, 1939 as assistant counsel for the Conservation Commission. Later he was appointed assistant counsel of the Corporation Commission and then general counsel.

• Appointment of **Colleen Fowler** of Kansas City, Mo., as chairman of the Home Service Committee, American Gas Association, has been announced by **J. H. Warden,** chairman of the Association's Residential Gas Section.

For the last seven years, Miss Fowler has been director of Home Service for the Kansas City Gas Co. Prior to that time she was a director of Home Service for the Kansas Electric Power Co.

In 1940, she was Home Service Chairman for the Midwest Regional Gas Sales Conference.

• **Marshall M. Drake,** superintendent and operating instruction and employment manager, Philadelphia Co. and subsidiary companies, has been appointed assistant director of personnel.

Drake is a graduate of Penn State college. He joined the Pittsburgh Railways Co., in 1926, as research engineer. Later he assumed his superintendent and managerial duties for the Philadelphia Co. He is a director of the Pittsburgh Personnel Association.

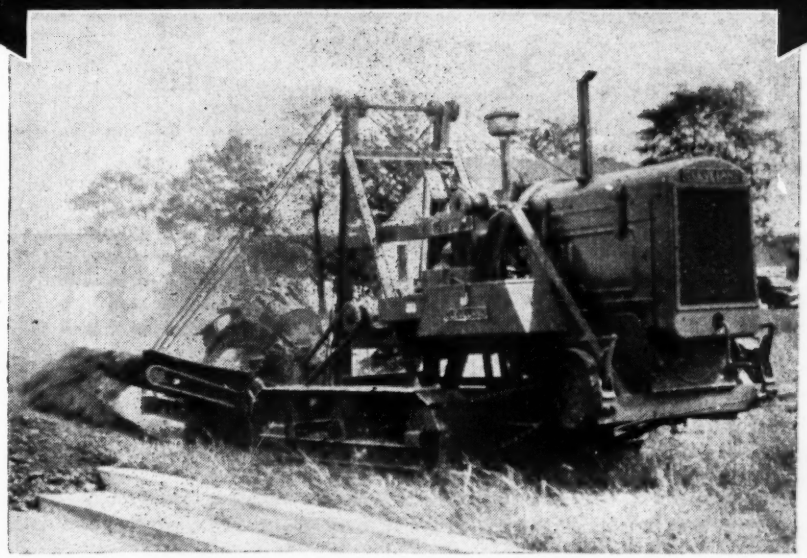
• **William J. Foster, Jr.,** advisor on rates and rate problems, cost accounting and depreciation matters, New York State Electric & Gas Corp., succeeds **Gray A. Strain,** vice president who has retired.

Foster was graduated from Amherst college. He has a background of 26 years in his field, and from 1922-42 was employed by the Ithaca utility in a consulting capacity.

• **W. T. Rogers** of the Industrial Relations Department, Ebasco Services Inc., New York City, has been appointed chairman of the Accident Prevention Committee of A.G.A. This committee is the clearing house for all Association matters pertaining to safety in the gas industry.

Rogers is a member of the A.G.A. Personnel Committee and of the following: Accident Prevention Committee, Edison Electric Institute; Safety Committee, American Institute of Electrical Engineers; Executive Committee, Public Utilities Section of the National Safety Council. He is also a member of the American Society of Safety Engineers and the Society of American Military Engineers.

Use CLEVELAND BABY DIGGERS



On Those Long-Postponed Distribution Jobs

The Cleveland Baby Digger — the trencher that first made machine digging economy possible on short scattered urban distribution jobs . . . is tougher and faster than ever, yet enjoys the same compactness and mobility as always. • Write now for details . . . "CLEVELANDS" are available for next year's work.

THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVE. "Pioneer of the Small Trencher" CLEVELAND, OHIO
"CLEVELANDS" Save More . . . Because they Do More

Manufacturers

• **A. L. Forbes,** vice-president and formerly general superintendent of the El Paso Natural Gas Co., has been made vice-president and general manager of the Pressure Weld Co. He is in charge of the Houston office. Forbes retains his general connection with the El Paso Natural Gas Co.

The Pressure Weld Co. opened an office in Houston, Texas in order to facilitate the work of Pressure Welding the Texas section of the Tennessee Gas and Transmission Co.'s 24-in. pipe line. Later last year it was determined to continue the office in Houston. In September, space was taken in the Niels Esperson Building.

The Pressure Weld Co. is a wholly owned subsidiary of the El Paso Natural Gas Co.

• **Paul J. Wolfert,** assistant to the manager of construction equipment of the Blaw-Knox Division of the Blaw-Knox Co., has been promoted to export department engineer, according to an announcement made by the company. He took up his new duties in New York on Jan. 2, and will assist **H. T. Schwier,** export manager. Wolfert joined Blaw-Knox as a sales engineer at Pittsburgh in 1939. In the spring of 1942, he was promoted to assistant to the manager of construction equipment.

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Selecting ARCCO-ANUBIS
LIQUID GRAVITOMETERS
1 PRECISION BUILT to give PRECISE measurements of Specific Gravity.
2 Fully temperature compensated to record at 60° F. or other predetermined temperature.
3 Sample flows continuously.
4 Foreign liquids and gas are automatically purged.
5 Accurate recordings are made with minimum time lag.
6 Accuracy maintained with minimum attention.
7 Perfectly adapted to high pressure operation.
8 Hundreds in use in refineries, plants and lines of major companies.
AMERICAN
RECORDING CHART CO.
3113 E. 11th St. Los Angeles 23, California
SEND FOR COMPLETE LIST OF ARCCO CHARTS

• **Paul B. Sagar** has been appointed Eastern field engineer for General Controls Co., Glendale, Calif. Working out of the Cleveland Factory Branch, 3224 Euclid Ave., Sagar will devote the major part of his time collaborating with Eastern appliance manufacturers in working out problems of application and assisting them in test procedures at the American Gas Association Laboratory. He was formerly a test engineer in the Cleveland A.G.A. laboratory.

Further duties of Sagar's include the inauguration of an educational program for Eastern utilities manufacturers, jobbers, and dealers to acquaint them with the application and installation of General Controls' equipment.

• General Controls Co., Glendale, Calif., announces the appointment of **James King** as field sales engineer in their New York Factory Branch, 101 Park Ave. King will serve users of automatic controls, particularly in industrial fields, throughout Metropolitan New York. His background includes sales and service experience with Jenkins Valves in New York and New Jersey. As Jenkins' Texas manager, he directed industrial sales to oil refineries there. More recently he handled industrial oil sales for Pure Oil Co. in New York.

• **Fisher Governor Co.,** Marshalltown, Iowa, announced the appointment, Dec. 16, of **Malcolm W. Black & Co.,** as its representative in metropolitan New York, Connecticut, and northern New Jersey.

A. W. Bailey, who has been associated with Fisher Governor Co. for the past 20 years, is a staff member. Offices have been established at 41 E. 42nd St., Room 520, New York city.

Black has been associated for the past 10 years with Manning, Maxwell and Moore in the Tulsa, Okla. area, first as sales engineer and later as district manager of the South West territory of eight states.

• **Robert Lawdor,** formerly with the Consolidated Edison Co. of New York, Inc., is now with the personalized heating division, Minneapolis-Honeywell Regulator Co.

He has resigned as secretary-treasurer of the Metropolitan House Heating and Air Conditioning Council; and **Edward J. Gerridge,** The Brooklyn Union Gas Co., was elected to serve out the balance of Lawder's term of office.

• **John C. Pankow,** Detroit-Michigan Stove Co.'s director of sales, has announced the appointment of **B. H. Giaretta** as sales manager of that company's Northern Division. This division includes the Chicago Metropolitan Area, the state of Wisconsin, and the upper peninsula of Michigan.

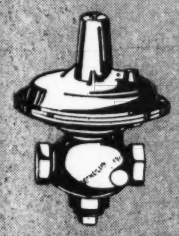
For the past 16 years, Giaretta has been associated with the Boston Store, Chicago, as major appliance buyer.

• **Frank J. Nunlist,** who has been acting chief engineer for the past year, for the L. J. Mueller Furnace Co., has been appointed chief engineer. Nunlist has been active in the heating and air conditioning industry since 1931, and has been with Mueller since 1940.

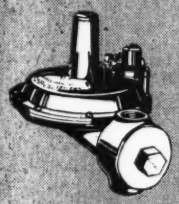
He is a member of the code committee of the American Society of Heating and Ventilating Engineers, and the technical committee of the National Warm Air Heating and Air Conditioning Association. He is also a member

52 YEARS OF EXPERIENCE

BACKS EVERY *Reynolds* UNIT



LOW PRESSURE



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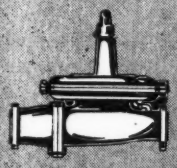

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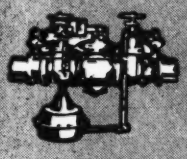

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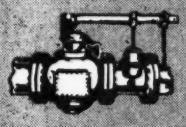

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★ Fifty-two years of successful experience in the Gas Control field has given Reynolds an enviable position of Leadership in that field. Regardless of place or type of regulation needed—in the line—at the station—for industrial plants—or in the home, there is a superior proven product by Reynolds.

The introduction of new regulators to meet changing requriements is proof of Reynolds' Leadership and is part of Reynolds' program of constantly improving its products. For, Reynolds is not contented to rest upon any past achievements. Reynolds is proud of its position and is determined to continue its Leadership—to the end that Reynolds will always be the one best source of supply for Gas Control Equipment.

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REYNOLDS GAS REGULATOR CO.
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✓ **Ideal for venting gas-burning appliances**

✓ **Light weight—easy to install and support**

✓ **Can't Rust**

✓ **Needs no painting**

✓ **Relatively low heat conductivity**

✓ **Available both round and oval**

✓ **Full range of sizes, 2" to 12"**

✓ **Complete line of Fittings and Accessories**

For details write for brochure TR-13A. Johns-Manville, 22 East 40th Street, New York 16, New York.

JOHNS-MANVILLE JM PRODUCTS

JOHNS-MANVILLE
TRANSITE FLUE PIPE
For venting gas-burning appliances

of the Engineering Society of Milwaukee, and an industry panel member of the War Labor Board.

Frank Schryer, has been appointed Mueller's plant superintendent. Schryer has served in plant managerial capacities for Cribben & Sexton Co., Chicago; Lindemann-Hoverson Stove Co., Milwaukee; General Edison Electric Appliance Co., Chicago; and for nine years was superintendent of International Harvester Co.'s Hamilton, Ontario, plant.

• **Tracy B. Madole,** has been appointed manager of Northern Sales Division of American Stove Co., Chicago. Madole was employed by George M. Clark and Co., division of American Stove, in 1927, after attending Drake University.

• **Edward B. Mockel** has rejoined the sales promotion department of Servel Inc., Evansville, Ind., after a two-year leave of absence.

Before the leave of absence, during which time Mockel was an expediter for Henry J. Kaiser Inc., shipbuilders in Providence, R. I., he was sales promotion representative for Servel's New England district.

• The Girdler Corp., Louisville, Ky., has appointed **Dr. Ronald E. Reitmeier** to the post of director of research and development of its Gas Processes Division. Dr. Reitmeier will have charge of the Division's comprehensive development program, designed to improve gas purification and manufacturing processes.

IT'S LIKE *writing* A LETTER HOME

These ads month after month . . . telling you that all of our production is going to war . . . are simply to remind you that the name to remember when you want real snap-acting gas controls after the war is

SPENCER THERMOSTAT CO. KLIXON ATTLEBORO, MASS.

SKINNER Leak Clamps Saddles

M. B. SKINNER CO. SOUTH BEND, IND.

CLAMPS AND SADDLES FOR CAST IRON AND STEEL PIPE. STANDARD OF THE WORLD FOR NEARLY HALF A CENTURY

GAS METER INDEXES AND FITTINGS

Many Standard Meter Parts Carried in Stock

We will be pleased to submit quotations to your specifications and blueprints.

THE E. F. GRIFFITHS CO.

346 E. Walnut Lane Philadelphia 44, Penna.

Obituaries

• **P. M. Downing,** 71, executive vice president, Pacific Gas & Electric Co., died Dec. 11 at St. Luke's hospital, San Francisco, after 43 years of service with the one company. He had been executive vice president and general manager, a position he obtained Aug. 1, 1929.

Downing, in 1901, when only six years out of Stanford university, was appointed division superintendent of the Bay Counties Co., San Francisco. Two years later he was made superintendent of substations and operating engineer for the California Gas and Electric Corp.

When, in 1905, Pacific Gas and Electric Co. was incorporated by the merger of the California Gas and Electric and the San Francisco Gas and Electric Co., Downing continued in his superintendent-engineer job until 1908 when he was appointed engineer of operations and maintenance. In 1917 he was named chief engineer and in 1920 vice president in charge of electrical operations. His duties previous to his 1929 promotion were as vice president in charge of electrical construction and operations.

• **Arthur Pierson Hirose,** 42, who was well known to the gas industry for his work with the McCall Corp. as director of promotion and market research, died Dec. 9. He was with McCall's until this fall when he joined **Newsweek** magazine.

Hirose won the research medal in 1941 in the Annual Advertising Awards. He later became consultant to the OPA in Washington, D. C., a member of the promotion advisory committee of the Magazine Advertising Bureau and research coordinator of the War Advertising Council.

Born in New York, Hirose began his career with **Electrical Merchandising,** a McGraw-Hill publication, and went to McCall's in 1934.

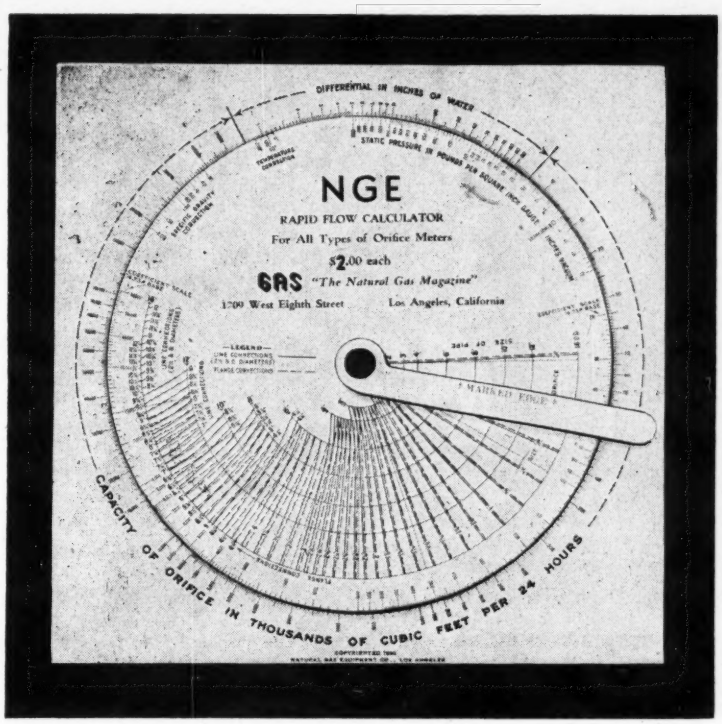
• **George H. Stang,** Brooklyn Borough Gas Co., Coney Island, N. Y., died in November. Stang, who had been director, secretary and assistant treasurer since 1929, joined the company in 1913. He was a veteran of World War I, and received a silver star and a citation for bravery for his service.

Samuel Newman was elected by the board of directors to take over Stang's assistant treasurer and directorial duties, while **John F. Droge** is the new secretary. Newman will also continue to serve the company as auditor.

• **Fred G. Merker,** 55, since 1933 district manager of Orange County for the Southern Counties Gas Co., at Santa Ana, Calif., died Jan. 9.

Merker became affiliated with the gas company in 1920, later being transferred to Ventura where he was named district manager in 1927.

• **Julius Brombacher,** 78, president and owner of the Superbo Manufacturing Co., Los Angeles, since 1917 producers of gas water heaters, passed away Oct. 23. Prior to his forming the Superbo company, Brombacher was engaged in the structural steel industry with the Brombacher Iron Works.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FPC Grants Rehearing To Wisconsin Company

The Federal Power Commission has granted the Wisconsin Southern Natural Gas Co. a rehearing Jan. 18 for the purpose of receiving additional evidence on the Commission's dismissal of the company's applications the object of which was to enable it to substitute straight natural gas for manufactured gas now served in Racine and Walworth Counties, Wisconsin.

The company's applications, which were dismissed by the Commission's order of Oct. 3, 1944, sought:

(1) An order to direct Natural Gas Pipeline Co. of America to extend its transmission facilities to the Illinois-Wisconsin boundary near Genoa City, Wisc., and to sell natural gas to Wisconsin Southern for distribution in southeastern Wisconsin, and

(2) A certificate of public convenience and necessity to authorize Wisconsin Southern to construct and operat a 4½-in. pipe line from the Illinois-Wisc. boundary to Wisconsin Southern's existing gas system at Lake Geneva, Wisc.

The company proposes to submit additional evidence concerning the newly-adopted ordinance of Burlington, Wisc., the largest of the communities served by the company, which had not authorized the proposed changeover from artificial to natural gas at the time the FPC adopted its order of Oct. 3. Further evidence will also be presented on the ability and willingness of the Natural Gas Pipeline Co. of America to serve natural gas to Wisconsin Southern.

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"INNER TUBE" REPAIR TECHNIQUE as practiced by the Portland Gas & Coke Co. is shown at the left with the 3-in. pipe protruding from the 6-in. main which had developed leaks under a deep highway fill near Newberg. The fill reached a depth of 40 ft. and extended 800 ft. Shown at the winch which pulled the long, welded 3-in. "inner tube" are Foreman Lloyd Edgell, Bill Niemi and D. L. Esplin, all of the Salem Distribution Bureau.

Repairing Gas Mains Under Deep Fills

Installation made by crew under Salem District Foreman Lloyd Edgell, Portland Gas & Coke Co., J. L. Verhei supervised operations.

HOW 800 ft. of 3-in. pipe was inserted as an "inner tube" for a leaking and deeply buried 6-in. high pressure gas main to conserve both manpower and material is an interesting story that comes from the Distribution bureau of the Portland (Ore.) Gas & Coke Co.

The "inner tube" idea was successfully applied at Rex hill near Newberg where a new section of highway covered to a depth as great as 40 ft. the main that was laid in 1930.

By-passing the deep fill with a new main would have required twice the material, involved several engineering difficulties and tied up manpower badly needed for other important main and service work.

Step number one was a temporary surface line to serve Newberg while repairs were made. Next, to make certain that the old main was straight enough to make the "inner tube" idea feasible, a one-in. pipe was run through to explore the situation.

Successful in this, the men used the 1-in. pipe to pull a cable back through the main. With the other end of the cable attached to a winch, 800 ft. of welded 3-in. main was pulled through with only minor difficulties and the job completed in record time.

The section involved is so comparatively short that even though the rate of pressure drop per unit of length is considerably greater in 3-in. pipe than in 6-in. pipe, the total pressure drop through the 3-in. section under present load conditions is negligible and will not be important even if the load on the line is substantially increased.

WANTED

Experienced Home Economist to take charge of Home Service Department for combination gas and electric company operating in Montana, North and South Dakota and Wyoming. Would make headquarters at Bismarck, N. D. Must be capable of conducting cooking schools and selecting and training home service girls. Write W. L. Hayes, 831 Second Ave. S., Minneapolis, Minnesota, giving full information as to training and experience.

Chicago Corp., Tennessee Gas Under FPC Scrutiny

The Federal Power Commission Dec. 18 ordered a comprehensive investigation into the natural-gas rates of Tennessee Gas and Transmission Co. and The Chicago Corp.: (1) to determine whether The Chicago Corp. is a natural-gas company within the meaning of the Natural Gas Act; and (2) into and concerning all rates and charges collected by the Tennessee Co. and The Chicago Corp. (if it be found to be a natural-gas company) in connection with any transportation or sale of natural gas subject to the jurisdiction of the Commission.

PIPELINE NEWS

• William G. Woolfolk, president of the **United Light & Power Co.**, has announced plans for construction of a $70,000,000 natural gas pipe line from the Hugoton fields of Kansas and Oklahoma to serve cities and towns in Iowa, Illinois, Wisconsin and Michigan. If the plan is approved by the Federal agency and local authorities having jurisdiction, Woolfolk said American Light's gas distributing subsidiaries in Detroit, Milwaukee and Madison, Wis., would become completely independent and would own and operate the proposed pipe line.

• **Louisville (Ky.) Gas and Electric Co.**, has FPC authority to construct and operate additional facilities, including a 65-mile pipe line to connect with the Tennessee Gas and Transmission Co.'s Texas to West Virginia pipe line which was recently completed. The natural gas to be transported by the proposed facilities is a supplemental supply for the company's existing system. The company has arranged to obtain 10,000 Mcf. of natural gas daily from the Tennessee Gas and Transmission Co.'s pipe line for service in the city of Louisville and environs.

• **Lone Star Gas Co.** has completed preliminary survey for a 105-mile large-diameter natural gas line from the Trinidad junction of its East Texas gathering system to the Carthage gas field of Panola County, it was reported from Fort Worth. The company recently made an initial payment of $800,000 cash to Rogers Lacy of Longview for gas from Lacy's gas producers in the Carthage area. The Lone Star company will move a natural gasoline and recycling plant which it owns jointly with Mr. Lacy in the Willow Springs pool of Gregg County to the Carthage field here. The Carthage gas will be processed before being turned into lines. The plant has a capacity of 50 million cu. ft. daily.

• The Federal Power Commission has set hearing for January 29, on an application filed by the **Tennessee Gas and Transmission Co.**, for authority to construct and operate about 65 miles of additional pipe lines in Texas. According to the application, the gas and oil fields to which the company wishes to connect its main Texas-to-West Virginia transmission line either have no market outlets for gas or have only limited outlets.

• The Federal Power Commission has issued a certificate of public convenience and necessity to the **Hope Natural Gas Co.** and a certificate to a group of subsidiaries of **Columbia Gas & Electric Co.** for natural gas pipe lines to enable these companies to obtain gas from the **Tennessee Gas and Transmission Co.** One certificate authorizes Hope to continue to operate facilities already constructed and operated by the company in Kanawha County, W. Va. under a temporary authorization by the FPC.

The other certificate authorizes United Fuel Gas Co., Warfield Natural Gas Co. and Cincinnati Gas Transportation Co., subsidiaries of Columbia Gas & Electric Co. of Charleston, W. Va., to construct and operate additional facilities in Kentucky and West Virginia.

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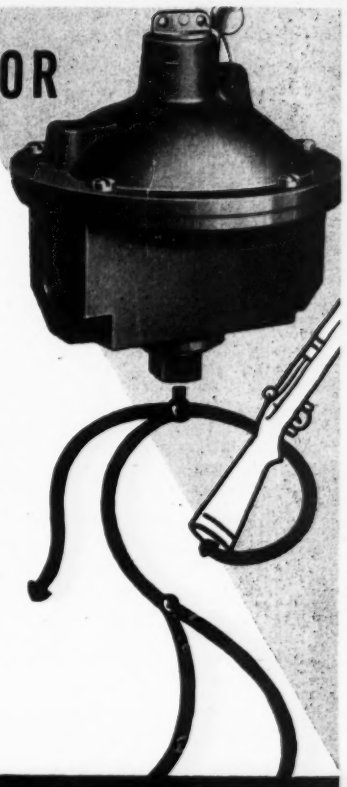

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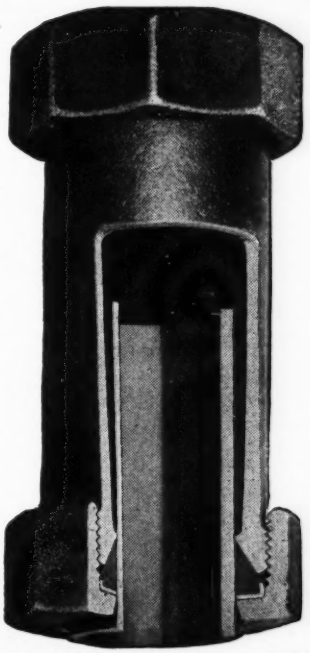

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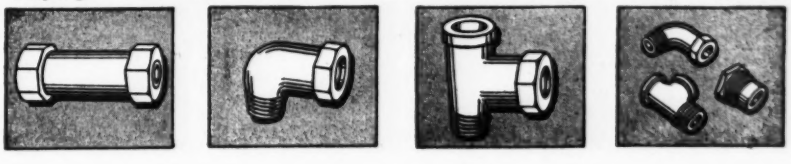


Texas Natural Gas May Be Piped to Canada

A plan is reported under consideration by City Gas Co. of London, Ontario, to use natural gas piped from Texas and Oklahoma. According to this report, virtually all the details have been completed whereby the Canadian city would be linked with a high pressure feeder that transports gas from the Texas and Oklahoma fields to Cleveland, Detroit and other United States cities.

London is only a couple of hundred miles from Detroit, and it is reported that pipe hitherto unavailable for such a link now is obtainable. City Gas Co. is a subsidiary of Union Gas Co. of Canada, Chatham, Ontario, and it is reported that the natural gas from the American fields would be combined with refinery gases available at Sarnia, Ontario.

Exhausted wells in southwestern Ontario have a special value under the plan. Part of the plan calls for these wells to be pumped full in off-peak seasons, thus to have a supply available in Canadian territory during the winter season.

Florence Stove Co., Buys Tennessee Factory

Another step in the Florence Stove Co. plans for postwar expansion in the cooking and heating fields was disclosed recently when President R. L. Fowler announced that arrangements have been completed for Florence to acquire the property of Marshall Stove Co. of Lewisburg, Tenn. No new financing is contemplated.

Plans are already under way for additional buildings. The entire plant will be newly equipped with the most modern machinery for the manufacture of stoves and heaters. As conversion makes it possible, the company expects to produce Florence gas ranges, LP-gas ranges, oil ranges, and oil-burning heaters. Other Florence factories are in Gardner, Mass., and Kankakee, Ill.

George B. Colburn, superintendent at Gardner for the past 16 years, has been elected a vice president of the company and is going to Lewisburg to assume full charge of the new southern factory. William E. Burns, assistant superintendent, succeeds Colburn as superintendent at Gardner.

Lewis Moore, Jr. will continue as president of Marshall Stove Co., whose entire production facilities are engaged in war work.

Hotstream Heater Doubles Cleveland Plant

With the erection of its new plant at 2363 East 69th St., Cleveland, the Hotstream Heater Co. has approximately doubled its production facilities, according to President L. R. Mendelson. The plant is now completely equipped to meet post-war demands for the water heaters and domestic, commercial, and industrial combustion control equipment produced by the company.

The company is now producing its regular line of products insofar as materials are available.

Columbia To Dispose of Assets Worth $196,000,000

The Securities and Exchange Commission in Philadelphia has ordered the Columbia Gas & Electric Corp., a major intermediate holding company in the United Corp., to dispose of $196,000,000 of its $600,000,000 assets.

This includes six operating companies in the Dayton-Cincinnati group: the Cincinnati Gas & Electric Co.; the Dayton Power & Light Co.; the Miami (Ohio) Development Co.; Miami Power Corp.; the Union, Light, Heat & Power Co., Covington, Ky., and West Harrison (Ind.) Electric & Water Co., Inc.

Eleven million dollars in incidental interests to be disposed of under the order include Columbia's holdings in American Water Works & Electric Co.; Argo Oil Corp.; Bridge Gas Co.; Columbia Corp.; Servel, Inc.; the Ohio Fuel Supply Co.; Columbia; Wood Coal Co.; Wooster (Ohio) Tool & Supply Co. and United Corp.

Jurisdiction was retained over Big Marsh Oil Co.; Amere (W. Va.) Gas Utilities Co.; Atlantic Seaboard Corp.; Binghamton (N. Y.) Gas Works; Eastern Pipe Line Co.; Home Gas Co., New York; the Keystone Co., New York; Virginia Gas Distribution Co.; Virginia Gas Transmission Corp., and Viking Distributing Co.

Philadelphians Approve Single Point Ignition

Caloric gas ranges, equipped with "single point ignition" are on the market in Philadelphia in a limited quantity and have won instant and enthusiastic approval of housewives, according to Julius Klein, general sales director of Caloric Gas Stove Works.

Development of single point ignition culminated many months of laboratory research by the American Gas Association Appliance Laboratory, the Philadelphia Gas Works laboratory and others with the cooperation of the Caloric Gas Stove Works.

C-B Servicemen Study Engine Developments

In order to provide field servicemen of The Cooper-Bessemer Corp. with up-to-the-minute information on the latest developments in the engineering and manufacture of the firm's gas engines and compressors, the entire service organization has been brought, a group of about 15 at a time, to the company's Mount Vernon, Ohio, and Grove City, Pa., plants. Each group has spent two days at each Cooper-Bessemer plant.

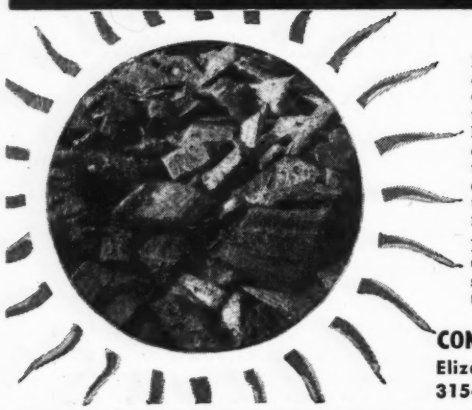
The field service crew consists of 63 men representing 15 branch offices of the concern throughout the country.

General Precision Acquires Askania Regulator

All the stock of the Askania Regulator Co. of Chicago, Ill. has been acquired by General Precision Equipment Corp. of New York. The present management of Askania will continue to be in charge of operations.

Askania Regulator Co. are manufacturers of hydraulic control systems used largely in the steel industry for the accurate proportioning of fuel mixtures in blast furnaces and other steel-making units.

CONNELLY IRON SPONGE



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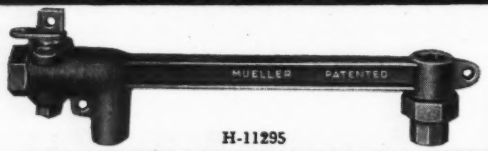

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